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REPORT

OF

THE COMMITTEE TO REVIEW THE EXISTING FACILITIES FOR THE SELECTION, TRAINING AND LICENSING OF CIVIL AIR PILOTS

1958

From

Shri K. M. Raha,
Chairman of the Committee to review the existing facilities for the selection, training and licensing of civil air pilots.

To

The Secretary to the Government of India,
Ministry of Transport & Communications (Deptts. of Commns. & Civil Aviation) *New Delhi.*

Dated New Delhi, the 31st January, 1958.

Subject :— Committee to review the existing facilities for the selection, training and licensing of civil air pilots.

Sir,

With reference to Ministry of Transport & Communications (Department of Civil Aviation) Order No. 15-A/54-57 dated 25th October, 1957, as amended by the Order bearing the same number dated 14th December, 1957, I have the honour to submit the report of the Committee.

2. One of the members of the Committee, Shri Bhadreshwar Prasad Singh, Managing Director, Hind Provincial Flying Club, Lucknow, has submitted a note in which he has made certain observations on the recommendations of the Committee. A copy of the note is appended to the report.

Yours faithfully,

Sd/ : K. M. RAHA,
Chairman.

REPORT OF RAHA COMMITTEE

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(ii) Govt. of India Order No. 15-A/54-57, dated the 14th December 1957.

Appendix 2.—Programme of enquiry. (Not printed).

Appendix 3.—(i) Questionnaire Part I dealing with training imparted by the Flying Club. (Not printed).

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Appendix 4.—List of bodies and persons to whom the copies of Questionnaires were sent. (Not printed).

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Appendix 14.—Note recorded by Shri Bhadreshwar Prasad Singh Managing Director, Hind Provincial Flying Club, Lucknow.

COMMITTEE

1. Shri K. M. Raha, Deputy Director General, Civil Aviation, New Delhi.—*Chairman.*
2. Group Capt. H. C. Dewan, Director of Training Air Headquarters, New Delhi.—*Member.*
3. Capt. P. D. Byramji, Divisional Operations Manager (Training), Air India International, Bombay.—*Member.*
4. Captain R. P. Huilgol of the Indian Airlines Corporation, New Delhi.—*Member.*
5. Shri Bhadreshwar Prasad Singh, Chairman, Hind Provincial Flying Club, Lucknow.—*Member.*
6. Shri B. M. Gupta, Principal, Civil Aviation Training Centre, Allahabad.—*Member.*
7. Shri M. C. Dikshit, Director of Training & Licensing, Civil Aviation Department, New Delhi.—*Member/Secretary.*

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

Co-pilot	A licensed pilot serving in any piloting capacity other than as pilot-in-command but excluding a pilot who is on board the aircraft for the sole purpose of receiving flight instruction.
D-4	Advanced Synthetic Trainer (type).
D.C.3	Dakota Aircraft.
D.G.C.A	Director General of Civil Aviation.
Flight time	The total time from the moment the aircraft first moves under its own power for the purpose of taking off until the moment it comes to rest at the end of the flight.
H.T.2	Hindustan Trainer Aircraft (type).
I.C.A.O.	International Civil Aviation Organisation.
I.F.R.	Instrument Flight Rules.
Instrument flight time.	Time during which a pilot is piloting an aircraft solely by reference to instruments and without external reference points.
Instrument ground time.	Time during which a pilot is practising, on the ground, simulated instrument flight on a mechanical device approved by the Competent Licensing Authority.
Instrument time.	Instrument flight time or instrument ground time
K.L.M.	Royal Dutch Airlines.
Pilot-in-command.	The pilot responsible for the operation and safety of the aircraft during flight time.
R.A.F.	Royal Air Force.
Rating.	An authorisation entered on a licence and forming part thereof, stating special conditions, privileges or limitations pertaining to such licence.
Sole flight time.	Flight time during which a pilot is the sole occupant of an aircraft.
V.F.R.	Visual Flight Rules.

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REPORT OF THE COMMITTEE ON SELECTION, TRAINING AND LICENSING OF CIVIL AIR PILOTS

I. INTRODUCTION

In order not to burden the body of this report with details which can more conveniently be included elsewhere, the Committee has thought it expedient to include references to the appointment of the Committee, terms of reference, programme of enquiry, issue of questionnaire, visits to institutions, examination of witnesses, etc. in the Appendices to this report. It is the desire of the Committee that this report should be a businesslike document, succinct and devoid of superfluities.

The report is in three sections :

A—Licensing of Civil Air Pilots.

B—Training of Civil Air Pilots.

C—Selection of Trainees.

SECTION A

LICENSING OF CIVIL AIR PILOTS

1.1. *I.C.A.O. Licensing System.*

1.1.1. Annex I of the International Civil Aviation Organisation lays dow requirements for the following types of Pilot's licences and ratings :

(i) Student Pilot Licence.
(ii) Private Pilot Licence.
(iii) Commercial Pilot Licence.
(iv) Senior Commercial Pilot Licence.
(v) Air Line Transport Pilot Licence.
(vi) Instrument Rating.
(vii) Flight Instructor Rating.

These licences are progressive in their requirements and privileges. In other words, after the issue of Student Pilot's Licence, each new licence is based on and presupposes the fulfilment of the requirements of the previous licence. The privileges of a licence-holder are also such that in exercise of them, he will naturally and easily qualify for the issue of the next higher licence. D.G.C.A. has recently forwarded to the Government draft rules (Appendix-11) and requirements for the introduction of the I.C.A.O. licences an India. These have been studied by the Committee. It was obvious at the very outset that the requirements for the issue and standards of these licences have been increased. Flying experiences have also been considerably increased. The D.G.C.A. has justified these deviations from I.C.A.O. recommendations. These justifications will be considered when dealing with the different categories of licences.

1.1.2. The Government, in their terms of reference to the Committee, have referred only to the professional licence, *e.g.*, Commercial Pilot's licence, Senior Commercial Pilot's licence, Air Line Transport Pilot's licence and the present Indian 'B' licence. The Committee has found it necessary to devote some time to the discussion of non-professional licences, such as Student Pilot's and Private Pilot's licences to examine whether these licences fitted into the overall scheme of training commercial pilots. It has also been necessary to discuss these licences in order to formulate recommendations regarding the training in Flying Clubs, as all flying in Flying Clubs will, initially, have to aim at the issue of these non-professional licences.

1.2. *Student Pilot's Licence*

1.2.1. *I.C.A.O. Requirements*

1.2.1.1. As the name suggests, it is a beginner's licence.

Annexure I of I.C.A.O. lays down no requirements for its issue except the Medical Fitness standard. Contracting States are asked to formulate requirements for the issue of this licence and to ensure that the Student Pilot does not constitute a hazard to air navigation. The Student Pilot will fly 'Solo' under the supervision of an Instructor holding a Flight Instructor Rating. He is also not allowed without any prior arrangements between the Contracting State to fly on an International flight.

1.2.1.2. *D.G.C.A.'s Proposals*

The guidance provided in Annex I of I.C.A.O. for the licence is very limited. D.G.C.A. has therefore, considered this licence as issued by various other countries and has formulated recommendations for adoption in India. He has, in doing so, slightly varied the requirements. The variations are as follows :

(i) The issue of this licence is not made necessary until a trainee is ready to go on his first 'Solo'.

(ii) He is required to pass an oral examination in the following subjects :

(1) Air legislation.

(2) Technical.

(3) Meteorology.

The standard expected is elementary and sufficient for a trainee to enable him to fly light aircraft locally as well as on short cross-country flights, under visual meteorological conditions. The privilege to fly has been limited to aircraft of a maximum gross weight of 1500 kgs. Individual aircraft endorsements will, however, be required on this licence.

1.2.1.3 *Recommendations.*

1.2.1.3.1 It is recommended that this licence be adopted in India. The Committee is also satisfied with the requirements proposed by the D.G.C.A. except that the lower age limit be reduced to 16 years in order that National Cadet Corps pupils may not be handicapped.

1.2.1.3.2 The Committee agrees that it is not necessary for a pupil to be in possession of a Student Pilot Licence during the initial dual instruction phase because he is not yet a potential hazard to air navigation. Dual flying instruction can commence after a short preliminary briefing by the Ground Instructor but this should not occupy more than a day or two to guard against the possibility of the pupil's enthusiasm flagging. During the four weeks or so before the pupil is ready to go solo, he will have received further ground instruction, passed his oral examination in legislation and technical subject, and applied for and obtained his Student Pilot's Licence.

1.2.1.3.3 The Committee also agrees that the restriction of 1500 kgs. gross weight for an aircraft, which this licence holder may fly, is justified for an *ab initio* trainee. In these cases when this licence is required to be issued for a glider or helicopter trainee and also in the case of pilots holding higher licences who may be required to acquire experience for renewal of an expired licence, the restriction on weight of the aircraft is not necessary and may be waived.

1.2.1.4 *Delegation of Powers to Aero Club of India for issue of Student Pilot's Licence*

1.2.1.4.1 Since the requirements for the issue of the Student Pilot Licence are not at all stringent, the Committee felt that the responsibility for the issue of this licence might be delegated to the Aero Club of India. By this simple expedient greater cohesion between the Flying Club and the Aero Club of India will be ensured. The Aero Club will also collect whatever fee is prescribed for the issue of this licence However, the revenue from this source is not expected to be large.

1.3 *Private Pilot's Licence*

1.3.1 I.C.A.O. requirements for the issue of this licence are a minimum age of 17 years, knowledge of rules relating to visual flights, elementary principles of aeronautical charts and meteorology, compass, theory of flight and aircraft operating limitations. Experience required is a minimum of 40 hours of total flight time and three hours of cross-country flight time 'solo'.

1.3.2 The candidate is expected to demonstrate his familiarity with and his ability to perform both normal and emergency flight manoeuvres appropriate to the category and the class of aircraft used in the test. The medical fitness standard required for this class of pilot is the same as for the Student Pilot. Instrument Rating are available on this licence after fulfilling the requirements for this rating. The pilot is privileged to carry passengers by day and also by night if he has acquired the stipulated night experience. He can also fly as a Co-pilot in any aircraft. He is not permitted to fly for remuneration.

1.3.3 *D.G.C.A's Proposals*

1.3.3.1 In his proposals, the D.G.C.A. has recommended a Written Examination on a slightly higher standard than that recommended by I.C.A.O. In the experience recommended, although he has kept the total flight time, dual and 'Solo' as 40, he has required the candidate to have within the 40 hours, 20 hours of 'Solo' flight time including 5 hours of cross-country flight time. Out of the 20 hours 'solo' time 10 hours will be recent experience completed during the preceding 12 months of the issue of licence. A flight test on single or multi-engined aircraft is also recommended by the D.G.C.A. to test the skill for the issue of this licence. In addition, the D.G.C.A. has also stipulated renewal requirements as 10 hours of solo flight time during the 12 months from the date of application for renewal in the absence of which a candidate will have to demonstrate his skill by undergoing a Flight test. Individual aircraft endorsements are required to be made on the licence, although provision has been made for experienced pilots having 500 hours as pilot-in-command on at least 4 different types of aircraft to fly all aircraft upto a maximum gross weight of 1500 kgs. without any individual endorsement. A provision for a night rating to enable a Licence holder to carry passengers by night is also made, for which he is required to have 50 hours of flight time as Pilot-in-Command including not less than 5 hours by night which must include at least 5 take-offs and 5 landings. He is also required to have 5 hours of Instrument Rating on this licence after fulfilling the requirements laid down for Instrument Rating. His privileges are the same as recommended in Annex I of I.C.A.O.

1.3.4 *Recommendations*

1.3.4.1 The Committee has considered in detail the D.G.C.A.'s recommendations and feels generally satisfied that the proposals meet the requirements for the issue of this licence. It, however, recommends the following changes :

(i) For the purpose of obtaining an open licence for aircraft up to 1500 kgs. gross weight, the pilot need have a total of 250 hours as Pilot-in-Command ;

(ii) for renewal, he need have not less than 5 hours as Pilot-in mand during the preceding 12 months ;

(iii) under the privileges of a night rating before a trainee is allowed to undertake a cross-country flight by night with or without passenger on board, he should be required to undertake a dual cross-country flight of at least 75 nautical miles in one leg with an intermediate landing before he can be permitted to undertake solo cross-country flying by night.

1.4 *Professional Pilot's Licence*

1.4.1 I.C.A.O. has recommended 3 licences under this category, *viz.*,

(1) Commercial Pilot's Licence.

(2) Senior Commercial Pilot's Licence.

(3) Airline Transport Pilot's Licence.

At present, we have in India two licences under this category *viz.*, 'A-1' Pilot's Licence and 'B' Pilot's Licence.

1.4.2 'A-1' Pilot's licence—can be issued to pilots with limited experience for limited commercial privileges. The issue of A-1 licence has gone into obsolescence. For the last many years, hardly any A-1 licence has been issued by the Civil Aviation Department.

1.4.3 Indian 'B' Licence is the highest commercial licence in India and all pilots including the senior-most airline pilots in India hold at present the Indian 'B' licence. The Indian Pilot's 'B' Licence has, in the course of recent years undergone certain changes and the standard has been gradually raised to that, in many cases, equal to the highest I.C.A.O. licence *viz.* Airline Transport Pilot's licence, by introducing requirements such as Instrument Rating, Command endorsements, periodical checks etc. The Committee feels satisfied that a stage in Indian aviation, at least in Indian Airlines Corporation and Air India International, has been reached where the implementation of I.C.A.O. licences will not cause undue difficulties.

1.4.3.1 Indian Aircraft Rules lay down the following broad requirements for the issue of 'B' licence :

The applicant should be between the ages of 19 and 45 years for the initial issue of 'B' licence. He is required to pass examinations in Meteorology, Legislation, Technical and Navigation of a standard which is higher than elementary, but does not require very detailed and specialised knowledge. Flying experience required is 200 hours 'solo' flight time within the preceding three years of application. This flight time includes 75 hours of cross-country flight, out of which 5 hours must be by night. The rules have been modified from time to time to insist on varying experience for different categories of aircraft and tests of skill have also been incorporated for renewal of these licences to ensure the competency of the pilot for efficient and safe operation of the aircraft.

1.4.4. *Commercial Pilot's Licence*

The Commercial Pilot's licence is the lowest of the I.C.A.O. professional licences and has a minimum of privileges of that class. In accordance with Annex. I, he shall not be less than 18 years of age and shall satisfy the Licensing Authority as to his knowledge of Air Legislation and Air Law Practices and procedures, practical Air Navigation including analysis of weather map and Meteorological reports, Navigational Instruments, theory of flight and technique and operating subjects pertaining to the aircraft

His total experience should not be less than 200 hours, of which 100 hours will be as Pilot-in-Command, which should include 20 hours of cross-country flight time. He should also have 10 hours Instrument flight time and 5 hours by night. Annex. I also required that his competency to fly will be tested by an appropriate authority for a standard of that class of licence.

1.4.4.1. *Privileges*

The following are the privileges given to him :

(*i*) That he shall exercise all privileges of a Private Pilot;

(*ii*) to act as Pilot-in-Command on any aircraft operated not for commercial air transportation;

(*iii*) to act as Pilot-in-Command in commercial air transportation in an aircraft of a gross weight of not more than 5700 kgs;

(*iv*) to act as Co-pilot in commercial air transportation in aircraft required to be operated with a Co-pilot.

Instructors and Instrument Ratings are available on this licence provided the requirements for these are fulfilled.

1.4.4.2. D.G.C.A., in his proposals, has modified the recommendations in the following manner :—

Experience : A candidate is required to have a total of 250 hours of flight time which shall include not less than 150 hours as a Pilot-in-Command and 20 hours of cross-country flight time. The instrument time and night flight time are the same as recommended by I.C.A.O. He has also required the candidate for this licence to be in possession of a current certificate of competency for operation of radio telephony apparatus.

1.4.4.3. In the aircraft ratings of the licence, provision has been made for granting of individual endorsements for aircraft and a general endorsement for all aircraft upto a gross weight of 1500 kgs. on completion of 1000 hours of flight time inclusive of 500 hours as Pilot-in-Command.

1.4.4.4. In the privileges proposed to be granted D.G.C.A. has omitted the privileges Nos. (*i*) and (*ii*) referred to above.

1.4.4.5. There are a number of points to be considered before comments are made on D.G.C.A.'s recommendations. The Committee has recommended elsewhere that the Commercial Pilot's training should only be carried out at a central establishment and the Committee has accordingly studied the provisions of this licence to examine whether the greater experience required by the D.G.C.A. is really justified bearing in mind the cost of training involved. I.C.A.O. have recommended a total experience of 200 hours which may be reduced by 50 hours if a course of approved training has been carried out. This reduces the figure to a total experience of 150 hours. D.G.C.A.'s recommendations of 250 hours of flight time in the light of this appear to be rather high since the privileges attached to these licences are proposed to be lower than those recommended by I.C.A.O. In the Section under Training the Committee has recommended the inclusion within the curriculum of training for Commercial. Pilot's licence the training for Instrument Rating also. The training for Instrument Rating will necessarily involve additional flying hours to bring an average candidate to the level required. A break-down of the training hours for Commercial Pilot's licence has been suggested by the Committee from which it will appear that a total of 250 hours at the Flying School will be required to enable a trainee to acquire the Commercial Pilot's licence and Instrument Rating and endorsement for twin engined aircraft. The finished product will be entitled and competent to operate any aircraft as a Co-pilot and fly as Pilot-in-Command any aircraft upto the gross weight of 5700 kgs. provided of course the aircraft is endorsed on his licence. In the present Indian 'B' licence the entire flying experience required has to be completed within the preceding three years from the date of application. In the recommendations of the D.G.C.A. this provision has been deleted and a provision to include 30 hours of flight time as Pilot-in-Command within a period of 12 months prior to his application is included as a measure to ensure recent experience. This, together with the stringent flying tests which have been laid down, will ensure the competency of a candidate. D.G.C.A. has increased the 'Pilot-in-Command' experience required from 100 to 150 hours in his recommendations. The Committee feels that D.G.C.A. has been justified in doing so, in order that a trainee after graduating from the Flying School and continuing his flying in an airline as a Co-pilot will not be required to put in an extra 50 hours of 'solo' flight time on a light aircraft, as 150 hours of Pilot-in-Command flight time is required for the issue of Senior Commercial Pilot's Licence.

1.4.4.6 *Recommendation*

It is recommended that the Commercial Pilot's licence, as proposed by the D.G.C.A. be accepted for implementation, with the following modifications :

(*i*) the total experience required for the issue of Commercial Pilot's licence should be 250 hours, of flight time which must include not less than 150 hours as Pilot-in-Command of which not less than 150 hours shall be within the period of 12 months immediately preceding the date of application for this licence ;

(*ii*) not less than 5 hours of dual and 25 hours of cross-country flight time as Pilot-in-Command including one flight of not less than 300 nautical miles in the course of which not less than 2 full-stop landings at different points shall be made;

(*iii*) not less than 10 hours of instrument flight time of which not more than 5 hours may be on approved synthetic flight Trainer ;

(*iv*) not less than 5 hours of flight time by night including a minimum of 10 take-offs and 10 landings by night as Pilot-in-Command and as Sole manipulator of the controls ;

(*v*) the total flight experience under paras. (*i*) to (*iv*) shall be completed within three years preceding the date of application of this licence ;

(*vi*) After para. 5(A) sub-para. 5 in the draft proposals of the D.G.C.A. (Appendix 11) under 'Commercial Pilot's Licence', an additional item should be included as "Emergencies" fire, engine failure, etc. and emergencies peculiar to the type of aircraft.

(*vii*) The Committee feels that in the renewal requirements, the number of hours stipulated should be 10 and it is not necessary to include 2 hours of night flying time, as the Pilot's competency for operation by night will have been ensured by his doing 10 take-offs and 10 landings during the six months preceding his exercise of privileges by night.

(*viii*) the local Aerodrome Officer, where the landings are performed should be authorised to issue a certificate on the spot that landings required under this rule for exercise of night privileges have been carried out;

(*ix*) the holder of the licence shall exercise all the privileges of a Private Pilot.

1.4.5. *Senior Commercial and Airline Transport Pilot's Licences*

1.4.5.1. Elsewhere under the section dealing with Training, detailed Training programme for these licences are discussed. Once the initial standard has been achieved qualifying for the next higher licences would be a matter of gaining more experience and training on the appropriate type of aircraft. The Committee has not thought it necessary to make very detailed comments in respect of Senior Commercial and Airline Transport Pilot's licences. There is no real need to vary the requirements of experience and technical standards, etc. as enumerated in Annex. I of I.C.A.O. Only those matters in which I.C.A.O. has not given specific guidance, such as renewal requirements, recent experience etc., need attention. These, in fact, have been drafted by D.G.C.A. and examined by the Committee.

1.4.5.2. *Total Flight Time*

D.G.C.A. in his recommendations to Government, has stated that the total flying experience required for the issue of Senior Commercial Pilot's licence should be 1200 hours. On analysis of total experience required, as stated in Annex. I read in conjunction with paragraph 2.13, crediting of 'Flight time', it is found that the total flying experience required should *be 1250* and *not 1200* hours, the details in respect of which are given below :

150 hours as Pilot-in-Command, 50 hours completed either as Pilot-in-Command, or 100 hours as Co-pilot performing the duties of a Commander under the supervision of a qualified Commander, *plus* 1000 hours of Co-pilot flying will be required to qualify for the issue of a Senior Commercial Pilot's licence. This will amount to 1250 hours of flying experience out of which 150 hours will be as Pilot-in-Command and 100 hours as Co-pilot performing the duties of the Commander under the supervision of a qualified Commander;

OR

a total flying experience of 1200 hours will be required if the candidate has 200 hours of Pilot-in-Command *plus* 1000 hours of Co-pilot time. Since in the training recommendations the Committee has allowed 150 hours of 'Solo' flying to the candidate graduating out of the Flying School, it is felt that he is not likely to obtain any more 'Solo' or Pilot-in-Command flying with any of the operators. The total flying experience required by the candidate will thus be 1250 hours of flying experience.

1.4.6. *Recommendations*

1.4.6.1. The following are the Committee's recommendations in respect of D.G.C.A.'s draft proposals for Senior Commercial Pilot's licence.

1.4.6.2. *Senior Commercial Pilot's Licence*

(*i*) Possession of a current Commercial Pilot's licence should not be made a condition for the issue of this licence.

(*ii*) Total experience required for the issue of this licence should be 1250 hours' total flying experience as computed in paragraph 1.4.5.2. above or 700 hours flight time as computed in I.C.A.O. Annex. I, paragraph 2.13.

(*iii*) Pilot-in-Command experience for the issue of this licence should not be greater than what is stipulated in Annx. I, *viz*. 150 hours.

(*iv*) For renewal, 10 hours of flight time (as defined in I.C.A.O. Annex. I' para 2.13) in the preceding six months is considered sufficient.

(*v*) The privilege of flying freighter aircraft upto 20,000 kgs. may be retained.

1.4.6.3. *Airline Transport Pilot's Licence*

1.4.6.3.1. The flying experience required for this licence should be a minimum of 2150 hours of flying experience or 1200 hours of flight time as defined in Annex. I, paragraph 2.13. The privileges and requirements of Instrument Rating are, however, incorporated in this licence.

1.4.6.3.2. The technical standards required for ground subjects are the same as for the Senior Commercial Pilot's licence.

1.4.6.3.3. For purposes of renewal and type endorsement, the D.G.C.A.'s proposals in this respect may be accepted with the following modifications:

(*i*) For renewal, 10 hours of flight time (as defined in Annex. I, paragraph 2.13) in the preceding 6 months is considered sufficient.

(*ii*) For aircraft rating, the Committee does not consider it necessary to insist on a specific number of flying hours' experience. The Committee is of the view that the passing of the requisite technical examination and demonstration of flying skill will serve the purpose. Such a procedure is also prevalent in almost all other countries.

1.4.6.3.4. In regard to the recommendations made by the D.G.C.A. the Committee was of the view that for purposes of exercising the privileges of a Co-pilot, the candidate need not be tested for proficiency on engine failure during take off since this is not a requirement under Annex. I of I.C.A.O.

1.5. *Instrument Rating*

1.5.1. A licensed pilot wishing to exercise his privileges under Instrument meteorological conditions, has to obtain an Instrument Rating.

1.5.2. An instrument rating can be granted to a licensed pilot having at least 150 hours of experience as Pilot-in-Command including 50 hours of cross country flight time and 40 hours of instrument flying. He should demonstrate his skill to pilot, navigate and 'let down' an aircraft solely by reference to instruments. If instrument rating on multi-engine aircraft is required, he shall demonstrate his skill with one or more engines inoperative.

1.5.3. The applicant for instrument rating shall also be required to pass an examination in ground subjects like practical air navigation, flight planning, aircraft performances, meteorology, radio navigational aids, instrument approach landing systems.

1.6. *Flight Instructor Rating*

1.6.1. The Committee has studied the draft for issue of Assistant Flight Instructor and Flight Instructor Ratings. The Committee is in complete agreement with the D.G.C.A.'s recommendations and these Ratings may be adopted as recommended. The Committee, however, feels that with introduction of instructor's rating, experienced airline instructors who may not have gone through any approved course of training but have acquired considerable experience may find themselves in difficulties to continue to exercise their privileges. The Committee feels that it is not necessary to insist on an Instructor's Rating for pilots engaged in instructional work with pilots already holding a Professional Pilot's licence.

1.7. *Implementation Date*

1.7.1. The D.G.C.A. has proposed a target date of 1st October, 1958 when all the licences issued on or after the date should be in accordance with the new standards. The old licences issued prior to 1st October, 1958, in accordance with current rules may remain valid for a period of one year to enable all pilots to acquire adequate qualifications and convert to new licences. If within this period all existing old licences are not converted they shall cease to be valid after 1st October, 1959. The Committee expects no appreciable difficulty in achieving the objective within a period of one year from the date of implementation of the new licensing system.

1.7.2. The position with regard to present holders of professional pilots licences is as follows :

(*i*) 'B' licence holders with Flight Radio Telephone Operator licence can be issued with a Commercial Pilot's licence without their having to go through any further training.

(*ii*) A 'B' licence pilot with required flying experience and Second Class Navigator's licence, Flight Radio Telephone Operator licence and command endorsement for aircraft above 5700 kgs. gross weight can be issued with Senior Commercial Pilot's licence.

(*iii*) A 'B' licence pilot with required flying experience, Second Class Navigator's licence, Instrument Rating, Flight Radio Telephone Operator licence, commend endorsement for aircraft above 5700 kgs. gross weight can be issued with Airline Transport Pilot licence.

NOTE: The Committee noted minor disparities in the Airline Transport Pilot, Senior Commercial and Second Class Navigator's Licences in so far as the standard of knowledge of navigation is concerned. After due consideration, the Committee has come to the conclusion that for purposes of conversion no separate examination need be prescribed.

1.7.3. *Conversion of 'A' Licence to Private Pilot's Licence*

Those 'A' Licence Pilots who do not fulfil the minimum flying experience for the issue of Private Pilot's licence will be issued with Student Pilot's licence to enable them to fulfil the requirements in due course. All others who have the required flying experience may be exempted from undergoing a technical examination and issued with Private Pilot's licence.

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SECTION 'B'

2.1. *Training of Civil Air Pilots*

2.1.1. For the convenience of examination of the subject, the Committee has divided this section into the following three sub-sections:—

2.1.1.1. (1) *Civil Aviation Training Centre*—which includes a detailed examination regarding :

(*a*) desirability of the continuance of the present administrative set up of the Civil Aviation Training Centre ;

(*b*) shortcomings in the present organization;

(*c*) location of the Flying School ;

(*d*) suggestions for improvement.

(2) *Operators*—the major operators in India, *viz*., Air India International, Indian Airlines Corporation and Non-Scheduled Operators have been separately dealt with by reason that they have their own individual problems and limitations. The operational requirements of these airlines are also such as to merit individual consideration.

(3) *Flying Clubs*—dealing with the examination of the present set-up *viz*., accommodation, equipment, personnel and the scope of training.

2.2. *The case for a Flying Training School for Commercial Air Pilot*

2.2.1. Towards the end of the Committee's deliberations, the members were made aware of the interesting possiblity that there may be no need for maintaining or establishing a separate school for training commerciral air pilots. Elaborating this view-point, the member from Air Headquarters mentioned that the Indian Air Force already had adequate establishments in the country not only for elementary flying training but also for training on transport aircraft and all the ratings that a civil air pilot is required to possess. The Committee visited these establishments and was impressed not only with the methods employed but also with the equipment provided and the quality and number of the Flight Instructors employed. By civil standards the facilities provided were beyond anything civil aviation could make available at the Civil Aviation Training Centre or elsewhere.

2.2.2. The cadets proceed initially to Air Force Flying College, Jodhpur, where they put in 125 hours of flying on HT-2 and Harvard aircraft which includes all facets of flying training such as aerobatics, cross-country, night flying and instrument flying. The whole course lasts 12 months during which period the candidates are given ground technical instruction on navigation, meteorology, airmanship, armaments and so on.

2.2.3. At the end of this stage a bifurcation takes place. Those selected for training on jets are sent to another centre and the remainder are sent for training on Dakotas to the Transport Training School. This course lasts for an additional 12 months during which time the pupil puts in no less than

250 hours' flying on Dakota. He emerges with about 150 hours of 'Solo flying and the equivalent of an instrument rating, in addition to acquiring a high standard of knowledge in technical subjects, navigation and so on. A qualified pilot from this school is comparable to the holder of a senior commercial pilot's licence except for the shortfall in total flying.

2.2.4. The Committee was told that the whole of the country's requirement of commercial pilots could be found from officers released from the Air Force. There were two ways by which this could be done—by embarking on a scheme of granting short service commissions in the Indian Air Force or by recruiting a larger number for entry into the Indian Air Force than that required for service with the Indian Air Force. The released officers under the first alternative and the surplus under the second would be available for employment with the airlines. It was made clear that trainees could not be earmarked in advance for employment in civil aviation not could trainees selected for commercial pilots' training be given training in these Service Schools. Recruits would have to enter the Air Force in the usual way dedicated to service with the Indian Air Force.

2.2.5. The Committee greatly appreciated the helpful attitude of the Indian Air Force and fully agreed that if such a commitment could be implemented in practice and a regular supply assured, there was indeed no need to establish any separate school under civil aviation auspices for the training of commercial air pilots to the standards envisaged in this report.

2.2.6. The Committee noted that this matter had been gone into in some detail by an earlier committee presided over by Shri M.A. Master and references to it will be found in paragraphs 186 to 194 of that Committee's report. One of the witnesses drew attention to the subsequent course of events. It appears that when Air Headquarters were consulted whether they were in a position to supply the required number of trained pilots, the reply was to the effect that the Air Force would not have surplus pilots for some time to come. It was on this basis that the D.G.C.A. proceeded to organise at the Civil Aviation Training Centre the training of pilots required for the air transport industry.

2.2.7. The Committee also noted that very much the same sort of arrangement was arrived at with the Royal Air Force in the United Kingdom for meeting the post-war needs of commercial pilots in that country. Apparently the source of supply from the Air Forces has now dried up in several countries important in civil aviation. In this connection, the following extract from an enclosure to a letter received from the British Council dated the 27th December, 1957, is of interest :—

"*General Air Training Limited*"

-*Commercial Pilot Training*

"At the present time airlines are faced with a serious problem of obtaining suitable young men with commercial Pilot's Licences who are capable of beign trained to airline standards as eventual Captains.

Whereas in the past the R.A.F. was the training ground for airline pilots, a growing demand coupled with a reduction in the size of the R.A.F. has now shown this source of supply to be inadequate.

At the same time the high cost of obtaining a commercial licence has discouraged the right type of young man from making a career in civil aviation and the cost of maintaining a Flying School has discouraged operators from undertaking their own training, although in recent months many have been forced to consider the possibility of doing so.

As a means of providing a regular supply of young qualified pilots of suitable educational background, the following flying training plan is offered as a service not only to airline operators but also to young men who wish to make civil aviation their career with a guarantee of employment with an airline operator.

General Air Training Limited, in conjunction with their Bankers, United Dominions Trust Limited, have devised a plan providing for a flying training course to Commercial Pilots Licence standard with instrument rating, which normally occupies twelve months and is both residential and full time. By this plan any heavy expense to the prospective commercial pilot is avoided and the cost of training suitable pilots is substantially reduced."

Details of the above scheme will be found in Appendix 7.

2.2.8 In the Netherlands, the Department of Civil Aviation runs a training school for commercial pilots where training is given to *ad initio* pupils upto commercial pilots' standard involving a total flying of 302 hours. The following extract from a memorandum received from the Department of Civil Aviation in the Netherlands is of interest:—

> "At first K.L.M. (Royal Dutch Airlines) recruited their pilots from military aviation. Only a short complementary training was required to render the selected military pilots suitable for their new function.
>
> According as the requirements put to the commercial pilots as a result of the rapid development of the commercial aircraft and the means of navigation became more stringent it became more difficult to recruit the required number of men from this source. Moreover, not every military pilot was found to be a suitable commercial pilot and the requirements laid down especially for military pilots often differ from those applying to a commercial pilot".

The memorandum will be found in Appendix 8.

2.3 *Recommendations*

2.3.1 The Committee considered that it would be unwise to do nothing and rely wholly on the Air Force to meet the entire demand for commercial air pilots in the future. The world situation is undergoing a constant change and it would be rash to gamble on the exigencies of the future. At the same time the Committee believed that due weightage should be given to the possibility of obtaining atleast a part of the numbers required from Air Force sources. The Committee accordingly concluded that a Flying School should be established and maintained for the training of atleast half the expected demand of commercial air pilots in the years to come. The Indian Air Force should, therefore, be approached for the release of atleast 25 transport pilots annually. The Committee believed this was a risk worth taking, not only for economic reasons but also for providing an avenue for rehabilitating released Air Force pilots.

2.3.2 The Civil Aviation Department have estimated that the total demand for commercial air pilots during the foreseeable future is not less than 50 per year. This number, in addition to meeting the requirements of the Indian Airlines Corporation, the Air India International, the non-scheduled operators and the Flying Clubs, is expected to leave a small surplus for State-owned aircraft, aircraft owned privately or by commercial firms and for aircraft engaged in aerial work such as air survey, mineral prospecting, agricultural aviation, pest control, medical and public health services, etc. The Committee accordingly recommends that for the immediate future the Flying School should be organised for an output of 25 commercial pilots annually. After allowing for wastage during training, the number admitted for training should not exceed 30 a year. It is on this basis that the requirements in subsequent paragraphs have been worked out.

2.4 *Flying School Constitution*

2.4.1 The subject evoked the liveliest discussion among the members. Several of the Committee's better advised witnesses were very emphatic that the Civil Aviation Department should not continue to operate the Flying School within the set-up of the Civil Aviation Training Centre and the Department should confine itself to training personnel required for their own services, namely, Air Traffic Controllers and Operators, Aeronautical Inspectors, Aircraft Maintenance Engineers and other aerodrome personnel. The Committee was advised by these same persons that training and licensing functions should not be in the same hand. In other words, since the licensing function has to remain directly in the hands of the Director General of Civil Aviation, the training of commercial pilots should be undertaken by some other independent body. Beyond repeating that the combined functions were undesirable, none of these witnesses could produce any valid reasons why this was so, except for pointing to certain licensing irregularities which occurred seven years ago. This was all the more surprising since the Committee had before it the example of the excellent Flying School operated by the Civil Aviation Administration of the Netherlands.

2.5 *The Case for an Independent Flying School*

2.5.1 The two members representing the nationalised air corporations supported by the Air Force member made out the following case for reconstituting the Flying School on different lines.

2.5.2 The present administration of the Civil Aviation Training Centre suffers greatly as it has no separate and independent set up for its Flying School. The requirements of a Flying School are totally different from those of the Ground Schools. The pace at which the Flying School operates is different from that of the Ground School. The constitution of the Flying School must be such that it infuses confidence in student pilots undergoing training and it must also be in a position to modify or change any of its syllabi and curricula in the light of the changing flying standards and requirements in world aviation today.

2.5.3 *Executive Body*

2.5.3.1 These, the concerned members felt, could only be achieved if the Flying School were to be separated from the main body of the Civil Aviation Training Centre and administered by an Executive Body responsible directly to the Minister. This Executive Body should be in a position to make its own budget, recommend the appointment of its own Commandant for this School and to appoint instructional and engineering staff etc. for the running of this School. Though the members appreciated the advantages of having the ground school and the Flying School located at one place with some of the equipment in common use, they felt strongly that the separation of the Flying School to the extent mentioned would go a long way in re-modelling the school to the best advantage. The Executive Body should be constituted in such a way as to include high ranking executive officers of the Air India International and the Indian Airlines Corporation along with representatives of the Ministry of Finance, Ministry of Communications (Department of Civil Aviation), a member from the Directorate General of Civil Aviation and an independent person with vast aviation experience. The concerned members also felt that the Commandant of this school should be a man with extensive flying experience who in turn will be in a position to assess his Flying Instructors and the trainees and will also be in a position to infuse sufficient confidence and respect amongst the staff and pupils. The present set up was criticised by these members as having no proper link between the administration, and the flying staff and pupils.

2.5.3.2 It quickly became clear that on merits there was no difference of opinion that for maximum effectiveness it would be far better if the Flying School could be reconstituted as an independent autonomous body with wide powers delegated to a governing body on the lines of a business undertaking. The financial implications of such an independent set up would have to be settled between the Government and the Airlines.

2.5.4 *Advisory Board*

2.5.4.1 If, due to the inability or unwillingness of the airlines and the Government to take on such a major commitment at the present time, the training of Pilots has to continue at the Flying School, the next best alternative would be to appoint the same board as envisaged in the previous paragraphs but with advisory instead of executive functions. The board may be expected to meet three or four times a year and to advise the Government on the following matters among others relating to the Flying School:—

(*i*) Budget;

(*ii*) Appointment of Chief Flying Instructor;

(*iii*) Curricula and syllabi for flying instructions;

(*iv*) Adequacy of Flight Instructors, Assistant Flight Instructors, single and twin-engined aircraft, synthetic flight trainers and visual and navigational aids for flying and ground training;

(*v*) Source of recruitment of Instructors, salaries of Flight Instructors and Inspectors of Flying and;

(*vi*) Capital works to be executed for the provision of residential accommodation, recreation facilities, office buildings, hangars, workshops and technical buidings.

2.5.4.2 The representatives of the nationalised Air Corporations, supported by the Air Force member, however, felt that if such a body had mere advisory functions, it would result in forming yet another channelising process making the normal delays more prolonged rather than help the efficiency of the Flying Institution. In other words, mere authority to advise without power to execute will not achieve the desired result.

2.5.5 *Civil Aviation Training Centre Handicaps*

2.5.5.1 Throughout the history of the Civil Aviation Training Centre, the Flying School has been beset with difficulties, mainly with regard to the employment of qualified Flight Instructors in adequate numbers, availability of training aircraft, inadequacy of accommodation and other physical amenities. The administration has been handicapped through having to operate the Flying School within the inflexible framework of Government accounts and audit system. Whatever is the final outcome of the Committee's recommendations, one thing is clear that the two Corporations must be associated more fully than it has been in the past with the operation of the Flying School. Hitherto, Indian Airlines Corporation have been very lukewarm in the matter of deputing qualified personnel to the Civil Aviation Training Centre Flying School to act as Flight Instructors. As a result, the shortage of Flight Instructors has been almost chronic. For instance, at the present time, there are no less than 98 flying pupils at the Civil Aviation Training Centre, but the number of Instructors available is only four. The fifth met with an accident and is convalescing. Only by making the Corporations realise that the efficient operation of the Flying School is as much their responsibility as the operation of air services can the situation be rectified. With this end in view, the Committee fully endorses the suggestion that the Flying School should be reconstituted on commercial lines and that a management body be appointed as recommended in the previous paragraph.

2.5.5.2 The Committee appreciates that it would be unreasonable to expect the Flying School to remain as a wing of the Civil Aviation Training Centre, financed directly by Government and to entrust its management to a body invested with wide financial and executive powers. Moreover, the presence of two chief executives, *i.e.* the Principal of the Civil Aviation Training Centre and the Commandant of the Flying School within the same organisation at the same place and sharing common facilities may lead to disharmony between the staff and trainees in the different branches.

2.5.6 *Location of the Flying School*

2.5.6.1 Climatically, Allahabad is not ideal for the operation of a Flying School. For the greater part of the year, flying is possible only in the early mornings. The weather is generally too turbulent in the afternoons for imparting flying instruction. Had the School been located at a place where flying need not be restricted to the above extent, better utilisation of aircraft would have resulted. Though there is advantage in having certain common facilities available at Allahabad, such as the lecture room, ground instruction facilities, Doctor, the Meteorologist, the Club House and so on, these do not constitute a major part of the facilities that are required to be provided for the Flying School.

2.5.6.2 There is also an upper limit to the amount of instructional flying that can be permitted at an aerodrome, consistent with safety. Already, it is not uncommon to have as many as ten or more aircraft circling Bamrauli airport at the same time. There is an Air Force Auxiliary Squadron at Bamrauli. The Hind Provincial Flying Club is also located there, the tempo of whose flying may be expected to increase as the National Cadet Corps movement gathers strength. A scheduled air service operates daily through this airport Though saturation point has not yet been reached, it is clear that the volume of instructional flying at Bamrauli cannot be substantially increased.

2.5.7 *Recommendations*

2.5.7.1 If the Airlines and the Government are able and willing to undertake the responsibility to establish, equip, staff and operate a Flying School with financial assistance from the State, the limits of which will have to be negotiated, the Committee strongly recommends that such a course be adopted.

2.5.7.2 If the above suggestion is found to be impracticable at the present time the only course open would be to let the Flying School continue as a wing of the Civil Aviation Training Centre. In that event, it is recommended that an Advisory Board be appointed by Government as contemplated in paragraph 2.5.4.

2.6. *Civil Aviation Training Centre, Allahabad*

2.6.1. *The Present Position, Functions, Commnads and Control*

2.6.1.1 The Civil Aviation Training Centre comprises of four different schools situated at Bamrauli, Allahabad. The Civil Aviation Training Centre is housed in old wartime barracks and consists of:—

(1) the Air Traffic Services School;
(2) the Tele-Communication School;
(3) the Engineeing School;
(4) the Flying School.

While the first three schools train the candidates for absorption within the Department of Civil Aviation the Flying School is responsible for meeting the entire needs of pilots for Civil Aviation in India.

2.6.1.2. The Director General of Civil Aviation is responsible for the control, management and provision of finances for the Civil Aviation Training Centre. A high ranking officer of the Civil Aviation Department has been appointed as the Principal of the Civil Aviation Training Centre. The Principal is in overall charge of the Civil Aviation Training Centre and is responsible for providing administrative services and for co-ordinating training activities in the various schools. For this purpose, he, in turn, is assisted by an administrative officer and specialist technical officers to run each school.

2.6.2. *The Flying School*

2.6.2.1 The following two courses are being simultaneously run:—

(*i*) *Ab initio* course for University graduates;
(*ii*) an 'intermediate' course for pupils with 100 hours of previous flying experience.

Selection for these courses is done through advertisements calling for applications from graduates with no flying experience and Intermediates with Science possessing 100 hours of flying experience. After the scrutiny of the applications, the eligible candidates are interviewed by a Selection Board composed of:

(1) A Deputy Director-General of Civil Aviation;
(2) A Representative of Air India International;
(3) A Representative of Indian Airlines Corporation;
(4) Director of Training & Licensing, D.G.C.A., and
(5) The Principal, Civil Aviation Training Centre.

The candidates are also required to write an essay on a familiar topic prior to the interviews. The Board conducts interviews and examinations at Bombay, Madras, Calcutta, Allahabad and Delhi. The selected candidates are medically examined by the Director of Medical Services, Air Headquarters and admitted into the Flying School.

2.6.2.2. Course (i) is of two years' duration while the intermediate course is of 18 months' duration. Recruitment to these courses is generally done once in a year, and there are, at present 98 trainees in the Pilot Courses.

2.6.3. *DC-3 Conversion Course*

2.6.3.1. In addition to the above courses, a DC-3 Conversion Course is also being run there once in every four months for conversion of the existing 'B' Licenced Pilots. The objectives with which the Dakota training at the Civil Aviation Training Centre was started were:—

(*i*) to train unemployed 'B' licensed pilots for utilisation in the airlines and

(*ii*) to standardise the training for Dakota aircraft which is a basic aircraft for all the airlines in India.

2.6.4. *Second Class Navigator's Course*

2.6.4.1. A six months' course is being run in ground subjects pertaining, to the issue of Second Class Navigators' licence. It is not mandatory for the trainees in courses (i) and (ii) to undertake this course.

2.6.5. *Scope of Pilots Training*

2.6.5.1. The Flying School is responsible for training pilots for 'B' licence, Flight Radio Telephone Operator and DC-3 provisional endorsement. For this, they receive ground training in the following subjects:

(*i*) Air Navigation.

(*ii*) Technical knowledge of air frames and engines—Chipmunk, HT-2 and DC-3.

(*iii*) Meteorology.

(*iv*) Radio telephony and Morse.

(*v*) Air Legislation.

(*vi*) Air Traffic Control.

(*vii*) Theory of flight.

(*viii*) First Aid.

Flying training and training on synthetic flight trainers and items (*i*), (*iii*), (*v*), (*vii*) above are being undertaken by the staff of the flying school. For the remaining items in the above list, the facilities of other schools and administrative staff of the Civil Aviation Training Centre are utilised.

2.6.6. *Flying Training*

2.6.6.1 Flying Training is provided on two types of light aircraft (Chipmunk and HT-2), one light twin-engined aircraft (Anson) and DC-3. Each *ab initio* trainee (graduates) does a total of 260 hours of flying on HT-2 and 30 hours on Anson and Dakota aircraft, making a total of 290 hours. The actual break down of the dual and solo exercises is given in Appendix 12.

2.6.6.2 The 'Intermediate' course trainees do a total of 225 hours of which 195 hours are flown in Chimpunk and HT-2 and 30 hours on Anson and Dakota aircraft. The DC-3 Conversion Course is also a part of all through training for both *ab initio* and 'Intermediate' trainees.

2.6.7 *Equipment and Staff for Flying School*

2.6.7.1 At present, the Civil Aviation Training Centre, is equipped with 14 HT-2 and Chipmunk aircraft, 4 Ansons and 2 Dakotas. Three Link Trainers are available and one D-4 type advanced synthetic flight Trainer is 'on order'.

2.6.7.2 The Staff consists of 4 Flying Instructors and 3 Synthetic Flight Instructors. Though the establishment provides for 4 Senior Flying Instructors and 1 Junior Flying Instructor, the post of the Junior Flying Instructor has not yet been filled. At present, excepting one Senior Flying Instructor, all the Flying Instructors are from Indian Airlines Corporation seconded to the Civil Aviation training Centre for instructional duties and it has been decided by Government that future recruitment of instructors will also be on secondment basis from the Indian Airlines Corporation. This was necessitated as the scheme for recruitment of Instructors exclusively for Civil Aviation Training Centre from the open market had not worked well.

2.6.7.3 Based on the recommendation made with regard to the provision of Flying Instructors for the new set up (*vide* Appendix 13), the Committee noted that the present strength of 5 Flying Instructors for a total number of 98 flying pupils is totally inadequate. Ground instructional staff are also inadequate in numbers to cope with this quantum of work. Along with these, the shortage of aircraft is also pronounced. Unless immediate steps are taken to augment both the instructional staff and trainer aircraft, the Committee does not see any prospect of the Civil Aviation Training Centre being able to complete the training within the allotted time.

2.6.8 *Domestic Accommodation for Trainees*

2.6.8.1 The domestic accommodation for trainees available at the Civil Aviation Training Centre is very limited. For Officer Class trainees which includes the trainees in the Pilots' Courses, the accommodation is for 130. The increase in the number of trainees in the ground schools adversely affects the accommodation available to Pilot trainees.

2.6.9 *Recommendations*

2.6.9.1 The Committee has discussed elsewhere suggestions for a more effective administrative set up for the Flying School and has recommended an intake of 30 trainees for the Pilots' Courses after making due allowance for possible training wastage.

2.6.9.2 *Recommended Scope of Training*

2.6.9.2.1 The Committee has also come to the conclusion that the aim of pilot training at the Flying School should be:

(*i*) flying training up to the stage of Commercial Pilots' Licence,

(*ii*) ground training in technical subjects up to a stage required for the issue of Airlines Transport Pilot licence,

(*iii*) training for flying basic twin-engined aircraft, the Anson, (*iv*) the issue of Instrument Rating on this aircraft

(*v*) training for Flight Radio Telephone Operator licence and,

(*vi*) training for DC-3 endorsements only in respect of those trainees who may be sponsored by operators other than the nationalised Air Corporations.

It is proposed to compress the whole of this training within a period of two years.

2.6.9.3 *The Flying School—A Vacational Institution*

2.6.9.3.1 The summer months at Allahabad are associated with dust storms, poor visibility and hot gusty winds when neither Instructors nor pupils can be expected to give of their best. The weather during that sesaon is totally unsuitable for flying training. It is therefore suggested that the flying school should be made a vacational institution and that there should be a summer vacation from 15th of May to 30th of June. It is expected that with the introduction of a summer vacation the instructional staff will be able to avail of the break for taking their annual leave and cause minimum dislocation of training during the remainder of the year. The training course for Pilots should commence on the 1st of July. July and August are also monsoon months and therefore not comfortable for training of *ab initio* trainees. This period can be very effectively utilised for training the entrants on essential ground subjects prior to starting their flying training. The first year flying training will continue from 1st of September to 15th of May. A terminal examintion for Flight Radio Telephone Operator licence and ground subjects can be inserted some time between the 15th of December and end of December. An annual examination at the end of the year can take up a few days between the 1st of May and 15th of May. These examination periods could also be utilised for regular periodic flight checks.

2.6.9.3.2 The second year for this course will again start on the 1st of July after the vacation and the ground training in Airline Transport Pilot subjects and flight training in light aircraft for the issue of Commercial Pilots' licence will be completed. The last three months of the second year, *viz.* middle of February to middle of May will be devoted solely to the training on Anson aircraft and for the issue of Instrument Rating. The final examinations will again be interspersed as in the previous year between the 15th December and 30th December and 1st May and 15th May.

2.6.9.4 *The Scope of Flying Training*

In the first section of this report, the Committee has recommended adoption of I.C.A.O. system of licensing. Standards for the Commercial Pilot's licence which is the basic professional licence have also been laid down. The Flying School should aim to train pilots for Commercial Pilot's licence and their further training for the issue of Senior Commercial and Air Line Transport Pilot's licences can only be carried out in the Airlines. The Committee has also recommended that the Pilot-in-Command requirements for the issue of Commercial Pilot's licence should be 150 hours and the total flight time should be 250 hours. It has been possible to fit within these limits the training on light aircraft—Chipmunk or HT-2 and training on Anson aircraft for the issue of instrument rating. In addition, the pilot will also do 5 hours of Pilot-in-Command flying on Anson aircraft which has all the basic features of more advanced aircraft.

2.6.9.5 *Training on Light Aircraft*

2.6.9.5.1 In appendix 12 to this report, break-down of the hours required to be flown has been given. The trainee will be required to do a total of 210 hours of flying on HT-2 or Chipmunk aircraft out of which 60 hours will be dual and 145 hours 'Solo'. The remaining 5 hours would be utilised for checks and tests.

2.6.9.6 *Training on Twin-Engined Aircraft*

2.6.9.6.1 During the early post-war years, the private airlines had nominal training establishments and were reluctant to allocate sufficient funds towards pilot training. They were interested in employing pilots already trained in the Air Forces or elsewhere and utilising them directly as Captains or Co-pilots. One or two flight checks on the routes were given and the pilots started operating on the routes, without any systematic training. Under such circumstances, the Government decided to entrust the Flying School at the Civil Aviation Training Centre with the task of converting 'B' licensed pilots from the Clubs to Co-pilots on Dakota type of aircraft. The Government realised that the 'B' licensed pilots from the Clubs were inadequately trained and their flying standards were poor. Thereafter the Civil Aviation Training Centre was entrusted with the complete pilot training from the *ab initio* to the Dakota conversion. As mentioned elsewhere, the flying training was given in three phases—*ab initio*, Intermediate and advanced—through Chipmunk/HT-2, Anson and Dakota type of aircraft respectively.

2.6.9.6.2 After nationalisation of the private airlines, a stage has arrived in Indian Aviation, where one need not have the same fears of inadequate training as it existed before. The Committee believes that it is no longer necessary for the Flying School to undertake flying training on Dakota type of aircraft. The conversion to DC-3 is mainly the Operators' domain and this can safely be left to the nationalised air Corporations, at least for those pilots who are recruited by them. In any case, a Flying School cannot possibly give the continued and progressing training on air transport flying which an operating airline with proper training establishment can give.

2.6.9.6.3 It is also true that even a well equipped air-line is not the place for giving basic and fundamental training to pilots. Such fundamental training and basic knowledge can best be obtained through a school equipped solely for this purpose. It will be seen that the Flying School's constitution is so recommended as to cater for this need.

2.6.9.6.4 Having realised that the Flying School need not concern itself with pilot's training on DC-3, but only with basic training, the Committee was posed the question whether training on Anson aircraft would serve any useful purpose.

2.6.9.6.5 Expert witnesses testified on the usefullness or otherwise of the Anson as an intermediate aircraft towards proficiency in airline operation. After shifting the material in the discussion, the Committee was convinced that Anson aircraft had a definite and useful purpose towards training pilots on DC-3 particularly when availability of aircraft, and cost of training were also matters of concern.

2.6.9.6.6 The virtues of Anson aircraft are detailed below:

2.6.9.6.7 It is equipped with dual controls and has a complete instrument panel and a set of flying instruments and controls which are found in the heavier types of twin-piston engined aircraft. It has retractable landing gear, flaps and brakes with hydraulic system. The propellers can be put into coarse pitch to enable asymmetric flying, to be practised. In fact, the aircraft is capable of reproducing flying characteristics similar to that of Dakota aircraft though on a smaller scale. The Committee had taken into consideration the characteristics and performance of the Anson aircraft and has come to the conclusion that the training on this aircraft will give a trainee substantial and valuable experience on general conditions of flying and types of emergencies obtainable on any twin-engined piston aircraft. A trainee trained on Ansons will also feel confident of his ability to cope with asymmetric flying and landing. The Committee has, therefore, come to the conclusion that Anson aircraft should be used for twin-engine training at the Flying School.

2.6.9.7 *Extent of Training on Anson*

2.6.9.7.1 The Committee feels that enough dual training on this aircraft should be given to enable the trainee not only to acquire proficiency in the operation of the aircraft but also to obtain instrument rating on this aircraft. In the opinion of the Committee, 35 hours of dual training on Anson aircraft will meet the requirements. The Committee also feels that some 'Solo' experience on this aircraft is essential. Some solo flying which may not be less than 5 hours will give the trainee sufficient confidence to take over complete control of a twin-engine aircraft while acting as a Co-pilot if required to do so. This 'solo' flying will also give the trainee some maturity of judgment by which further training in the airlines on DC-3 type of aircraft could be reduced.

2.6.9.8 *Training on DC-3 Aircraft*

2.6.9.8.1 In the preceding paragraphs, the Committee has suggested discontinuance of DC-3 conversion for the pilots joining the Indian Airlines Corporation. The non-scheduled operators who were interviewed by the Committee at Calcutta desired that the training of their pilots on DC-3 aircraft could be carried out in the Flying School as they themselves neither had proper facilities nor spare aircraft which could be made available exclusively for training purposes. In order to meet this demand, it will be necessary for the Flying School to undertake the conversion of these pilots to DC-3. If the Indian Airlines Corporation takes the entire output of the school in any year, there need not be any DC-3 training at the Flying School, but if there is a surplus, the only institution where systematic training can be given will be the Flying School.

2.6.9.8.2 With increased flying on Anson aircraft it is felt that the amount of flying required for Dakota conversion could be substantially reduced. For an average trainee, 10 hours of 'dual' instructions including the emergency procedures will suffice for his general flying ability. He will be able to handle the aircraft in emergencies and execute single engine landings if required. These 10 hours of extra training on DC-3 aircraft for the benefit of the pilots sponsored by the non-scheduled operators will have, therefore, to be given at the Flying School and included in their training curriculum for DC-3 endorsement.

2.6.9.9 *Instructional Staff required for Flying Training*

2.6.9.9.1 In the Appendix 13 to this report, aircraft and instructor requirements for an intake of 30 trainees every year has been worked out and if instructors capable of giving instruction on both light as well as Anson aircraft could be found, the work load may be so divided as to complete the entire quota of 'dual' flying by 6 instructors. In addition, it will be necessary to have a Chief Flying Instructor for carrying out supervisory duties such as rejection checks, progress checks, instrument rating and licence checks etc.

2.6.9.9.2 The Commandant of the school should be a person who will be in a position to impart training on Dakotas.

2.6.9.9.3 Summarising, the Flying Instructional staff requirements will be as follows :—

Commandant

Chief Flying Instructor

6 Flying Instructors.

2.6.9.10 *Recruitment of Instructional Staff required for Flying Training*

2.6.9.10.1 The present arrangements for employing instructors at the Flying School from the strength of the Indian Airlines Corporation on deputation should be discontinued and the Flying School should employ a permanent staff. The Air Force representative has indicated that the Indian Air Force may be able to spare a sufficient number of trained and experienced instructors for use in the Flying School. If such an arrangement can be made, the Committee feels that the shortage of instructional staff will be removed in a very satisfactory manner. Necessary details for such transfer will, of course, have to be worked out by the Government Departments concerned.

2.6.9.11 *Checks for Flying Proficiency*

2.6.9.11.1 It is considered most important that a scheme for enforcement of a high standard of training is established alongside the training machinery. Such an enforcement machinery should be actively associated with the training machinery. It is considered essential that the Chief Flying Instructor, who would be more experienced than the other instructors, should also be permitted to check the progress of trainees independently. For this purpose, 2 flying tests are suggested, *viz.*, after 100 hours of flying on Chipmunk/H.T-2 and at the time of completion of the Chipmunk/H.T-2 course.

2.6.9.11.2 It is recommended that the Flying Inspector be permanently posted in the Flying School who will, from time to time, carry out checks on the instructors as well as on the trainees on percentage basis. This Flying Inspector should be directly responsible to the Director General of Civil Aviation and should submit reports periodically.

2.6.9.12 *Aircraft requirement*

2.6.9.12.1 Appendix 13 to this report deals with the aircraft requirement of the HT-2/Chipmunk and Anson types of aircraft. It has been calculated that a total of 18 light aircraft (HT-2/Chipmunk) including 4 standby aircraft will be needed for meeting the requirements. The Committee also finds that 7 Ansons will be required including reserve aircraft.

2.6.9.12.2 The Civil Aviation Training Centre has, at present, two DC-3 aircraft. For the recommended task of training, the non-scheduled operators' Pilots, one aircraft will suffice. The second aircraft can be maintained as a 'standby' and also used for other activities such as calibration of radio installations at the aerodromes in India.

2.6.9.13 *Synthetic Flight Trainers*

2.6.9.13.1 The Committee interviewed the Civil Aviation Training Centre's Link Instructor and the Expert Link Instructor made available to D.G.C.A. by I.C.A.O. The Committee was convinced that the present allocation of 30 hours on a synthetic flight trainer is far below the requirements and agrees that a minimum of 75 hours of training on a synthetic flight will be necessary together with a minimum of 20 hours of instrument flying in actual flight to enable a trainee to obtain sufficient proficiency to qualify for instrument rating. The Committee accordingly recommends that 75 hours may be allocated to each trainee in the pilot's course. A detailed syllabus of training for instrument rating on synthetic flight trainer is given in Appendix 10 to this report. A total of 4 synthetic flight trainers will be required and 4 instructors. The Committee in arriving at these figures has not taken into consideration the synthetic flight training given to the trainees in the other schools situated at the Civil Aviation Training Centre.

2.6.9.14 *Training for Instrument Rating*

2.6.9.14.1 In the preceding paragraphs, it has been stated that increased dual flying on Anson aircraft and increased flying on synthetic flight trainer will meet the requirements of an average pupil to pass instrument rating flying tests. For purposes of imparting instruction on Instrument Rating, it will be necessary to modify at least two Anson aircraft with appropriate airborne Radio Navigational aids.

2.6.9.15 *F.R.T.O. Licence*

2.6.9.15.1 The Communication School is at present being utilised for this purpose. The existing arrangement is satisfactory and is recommended to be continued.

2.6.9.16 *Ground Training*

With the implementation of the I.C.A.O. licensing system, the Second Class Navigator's licence which is currently in force will have to be withdrawn. However, the syllabii for technical subjects concerning the Senior Commercial and Airline Transport Pilot's licences will have included entirely the requirements for Second Class Navigator's licence. The only organised place of training where such training can be given is at the Flying School. The pilots who pass out from the Flying School with Commericial Pilot's licence will find very little scope in their professional careers to receive adequate coaching and facilities for study to attain the technical standards for Airline Transort Pilot's licence. The Committee, therefore, recommends that within a period of two years which a trainee will spend at the Flying School, he should be qualified upto Airline Transport Pilot's licence standard in the technical ground subjects. He will have ample time, facilities and guidance at the Flying School, for completing such training. The Committee does not wish to go into details regarding the syllabii for ground training as these will be dealt with by the D.G.C.A. in his recommendations to Government in so far as the licensing requirements for Airline Transport and Senior Commercial Pilot's licences are concerned. There are, however, certain subjects which though not directly included in the syllabii, the Committee feels it desirable to include in the curriculum of the Flying School. These are :—

(*i*) First Aid.
(*ii*) Fire Fighting.
(*iii*) Survival.
(*iv*) Practical work in workshop.
(*v*) Air Traffic Control.

2.6.9.17. *Training Wastage.*

It will be necessary to determine within the first few hours of the initial training whether a trainee is going to make a suitable Commercial Pilot. The instructor will assess the ability of the trainee and if not found suitable, will put up the case to the Chief Instructor when the trainee has completed about 10-15 hours of dual training. The Chief Instructor will transfer the trainee to the charge of some other instructor who may be expected to give him a maximum of 5 hours of dual and submit a fresh report to the Chief Flying Instructor. At each of these two stages, the pupil will be given a warning in writing. On receipt of a second adverse report, the Chief Instructor will himself fly with the trainee for a few hours and record his opinion. If he finds the candidate suitable, he may send him 'solo' ; if otherwise, he may put him up for rejection before a Board composed of the following to confirm the suspension :

(*i*) Principal'
(*ii*) Commandant of the Flying School
(*iii*) Chief Flying Instructor
(*iv*) Flying Instructor not connected with the trainees' flying instructions, or in the case of suspension on account of ground subjects the Chief Ground Instructor.

2.6.9.17.2. The Board should interview the trainee under suspension. The decision of the Board should be final and no further appeals from the trainee should be entertained.

2.6.9.17.3. In addition to the rejection tests suggested above, the Flying Ground Instructor will be at liberty to put up a trainee for rejection to their superior authorities at any stage of his training. The manner of dealing with such suspension cases will be similar to what has been stated above.

2.7 *Operators*

2.7.1. *Indian Airlines Corporation*

2.7.1.1. The Committee has inspected the training establishment at all the 3 bases of the Indian Airlines namely, Delhi, Bombay and Calcutta and have studied the existing methods of training and equipment for carrying out the Indian Airlines Corporation's training programme. Indian Airlines Corporation's training programme in detail is given in Appendix 9 to this report.

2.7.1.2. At each of their training centres, Indian Airlines Corporation have lecture rooms separately for engineering and navigation subjects. They have on their strength a number of qualified Instructors to impart training on each subject. Link Trainers are installed in all the three bases and in addition at Madras where a part of the training is also carried out. Equipment and the strength of Instructors at each Centre of the Indian Airlines Corporation's set-up are as follows : --

2.7.1.3. *Delhi*

(*i*) Flight Instructors—4. These Instructors give flying training for conversion and command training on their fleet.

(*ii*) Lecture rooms for navigation and technical subjects.

(*iii*) Lectures on meteorology are given by Instructors from the Meteorological Department. In addition, there is a large hall where sectioned models for demonstration and projector for audio-visual education are installed.

(*iv*) Synthetic flight training. There are two Link Trainers in use with two instructors and an additional "Procedure Trainer" has been ordered for use at this base. An Instructor has also been sent abroad for training on the "Procedure Trainer".

2.7.1.4. *Bombay*

The set-up is identical to the one explained above. There is, however, no proposal to set up a "Procedure Trainer" either at Bombay or at Calcutta.

2.7.1.5. *Calcutta*

Identical set-up exists at Calcutta except that they have four Link Trainers and three qualified Link-Instructors to operate them.

2.7.1.6. Out of all the Link Instructors of the Indian Airlines Corporation, three have been trained abroad with the K.L.M. (Royal Dutch Airlines) School in Holland and one each is posted at each training base. Similar training establishment exists at Madras where one Link Trainer with one Instructor is available. And there is one Technical Instructor, a Flight Instructor and provision for lecture room exists. After making allocation for operational use, one aircraft from the operational fleet is made available exclusively for training purposes.

2.7.2. *Recommendations*

2.7.2.1. The Committee feels that a 'Procedure Trainer' installed only at one base *viz.*, at Delhi will not fulfil the training requirements of the entire Indian Airlines Corporation. It is recommended that 'Procedure Trainer' may also be installed at Bombay and Calcutta. The Committee has proposed that within a period of one year, the existing licences are required to be converted to the new licensing pattern. It, therefore, becomes necessary that the Indian Airlines Corporation's conversion training programme should be compressed within this period. The existing training facilities in respect of Link and Ground Instructors are considered inadequate and will need considerable augmentation. This may be done within as short a period as possible so that the implementation of the new licences is not unduly delayed.

2.7.2.2. The augmentation of the strength referred to above will have to be continued and adopted as a permanent measure in order to ensure continued training and checking for maintenance of a high professional standard for the renewal of these new licences.

2.7.2.3. *Type Endorsement on DC-3 Aircraft* : Elsewhere the Committee has recommended acceptance of the suggestions that the Indian Airlines Corporation should do their own type endorsement training on DC-3 air craft for the graduates from the Flying School who may join the Indian Airlines Corporation. A minimum of 10 hours of local flying training on DC-3 aircraft is considered sufficient to enable a trainee to obtain proficiency within the limits of safety to enable him to function as a co-pilot on Dakota aircraft.

2.7.2.4. *Command Training on Dakota Aircraft :* In conformity with the suggested licensing requirements for Senior Commercial Pilot's licence, no operator will normally be eligible to give command on Dakota aircraft before he has flown as Co-pilot for at least 1100 hours. The present practice in Indian Airlines Corporation of giving 1500 hours of experience as a Co-pilot on DC-3 aircraft is considered adequate before a pilot is taken up for command training. The existing command training syllabus is considered sufficient, except that pilots should be given landing and take-off practice from the right hand seat and should be proficient to carry out all manoeuvres from the right hand seat also.

2.7.2.5. Proficiency of the pilot for type and command endorsement should be checked by a Government Inspector of Flying who should himself be qualified on the type of aircraft for which the endorsement is required to be given. The proficiency checks will be required to be carried out both by day and night or is so desired all checks may be carried out by night only. It is recommended that the Inspectors of Flying be authorised to issue a certificate to the candidate if he successfully carries out his checks, so that the candidate may exercise the privileges of the rating pending proper documentation.

2.7.2.6. Considerable discussion took place on the subject of the Airlines' Instructors holding the Instructor's Rating. This was not considered necessary for converting Airline Pilots. The Committee, however, felt that any airline pilot, before he is approved as a Check Pilot or as Airline Instructor should be subjected to a check for proficiency by an Inspector of flying,

2.7.2.7. *Checks for continued Proficiency*

2.7.2.7.1. The Committee recommends that the Check Pilots of the Corporation and the non-scheduled operators, approved by the D.G.C.A. should be allowed to carry out local checks for the renewal of Licences of the Pilots. It also recommends that at least one check every year be carried out at night. The Inspectors of Flying posted at all the Bases should be charged with the responsibility of supervising the checks carried out by the Approved Check Pilots. Also they should themselves carry out certain percentage of checks to ensure all checks are carried out with the thoroughness they deserve.

2.7.2.8. *Co-pilot Proficiency*

2.7.2.8.1. The question of keeping the Co-pilots under continued training and proficiency for discharging their duties effectively was examined by the Committee. The Committee felt that at the time of issuance of type rating, the Co-pilots should be fully proficient for carrying out their duties as required of them, which also includes the ability to reach an aircraft to its destination if the Commander were to become a casualty. However, the Committee felt this proficiency is not likely to be maintained if the Co-pilots do not get sufficient practice in take-offs, landings and other manoeuvres. The Committee accordingly recommends that approved Co-pilots may be permitted to carry out all the functions of a Commander, provided the official commader on that aircraft has 'sufficient Command experience' on that type of aircraft and that he is seated on the right hand seat of the flight deck and that he is in a position take over at any critical time in the interest of safety. The D.G.C.A. will lay down what constitutes 'sufficient Command experience'. It is only with this end in view that the Committee has earlier recommended the demonstration of the Commander's skill from both the seats.

2.7.2.9. *Refresher Course*

2.7.2.9.1. The Committee, while examining the syllabus and curriculum of training as given by the Indian Airlines Corporation and Air Indian International felt that in addition to what is presently being given, an annual refresher course should become mandatory on the types of aircraft on which the person exercises Pilot or Co-pilot privileges. The flights refresher should include checks and emergencies—drills of evacuation and survival. The ground training should also include the operating limitations of Airframe and Power Plant.

2.7.3. *Non-Scheduled Operators*

2.7.3.1. The Committee has inspected the training establishments existing with the Non-scheduled operators in Calcutta. Their syllabii and curricula are given in Appendix 9.

2.7.3.2. *Training facilities with Non-Scheduled Operators*

2.7.3.2.1. Improvement seems to have been made with regard to the ground equipment for training of pilots. They have combined into a group and obtained a synthetic flight Trainer, a class room and Instructors, etc., for imparting instruction to their pilots. They have no worthwhile training syllabus or curriculum for giving flying training to their pilots. However, non-scheduled operators mentioned that they would be willing to defray the cost of training to their pilots both for type endorsement and Command, if the Flying School were to undertake such training. In order that adequately trained and safe pilots are available for consumption by non-scheduled operators, the Committee recommends that the Flying School should undertake the training of such pilots on the Dakota type of aircraft on a 'direct operating cost' basis. This will ensure even standards of proficiency for the pilot so turned out and will also ensure the adequacy of training. The non-scheduled operators mentioned that they give training to their pilots on their routes, when the aircraft is on a ferry flight. This method has not been considered satisfactory and for this reason the Committee recommends that training for type and Command endorsement be carried out at the Flying School. As mentioned before, the Command checks of these pilots also should be done by the Government Inspector of Fying.

2·8. *Government Inspectors of Flying*

2.8.1. The Committee does not feel very satisfied with the present system of Approved Examiners in the Corporations. After a thorough discussion on the merits and demerits of present system, the Committee finally decided to recommend the revival of the post of Chief Inspector of Flying and an organisation under him with at least three Regional Inspectors of Flying. The Regional Inspectors of Flying may be located for convenience, at the three Bases of operators namely, Calcutta, Bombay and Madras. These Inspectors of Flying should be full-fledged commanders themselves, with considerable experience on the type of aircraft on which they are going to carry out checks. They should also be trained for carrying out checking duties and assessing proficiency for the issuance of type rating, Command and Check-pilot approval on the aircraft. Since a large number of Airline pilots is required to be checked, the Committee presumes the Inspectors themselves will get adequate practice to keep up their own proficiency.

2.8.1.1. Two more Inspectors (one for Flying Clubs and one for the Flying School) will be required exclusively for the use of training and checking programme. Instructor Rating would be necessary in the case of these two Inspectors of Flying who will be detailed for checking the Instructors of the Flying School, Flying Instructors of the Clubs and the pupils for selection for entry into the Flying School, for Commercial Pilots' course.

2.8.1.2. The Committee is aware of the fact that so far, the posts of Inspectors of Flying have not attracted the right type of experienced pilots. The Committee would recommend that, in order to attract the right type of material, the Government should offer attractive terms of service. Otherwise it is feared that this scheme will suffer the same fate as it has met so far.

2.8.1.3. In order that no hardship may be experienced by the operators with regard to the issuance of Type Rating or Command endorsement, the Committee would recommend the continuance of the present system until the recommendation with regard to the establishment of the Chief Inspector of Flying and his organisation are implemented.

2.9. *Air India International*

2.9.1. The Committee has examined the present training of the Air India International, the curriculum of which is given in Appendix 9. The Committee is satisfied with their set-up and procedures and no special recommendations are being made, as the adoption of the recommendations made above, with regard to other Operators, will ensure continued proficiency of the pilots.

2.10. *Flying Clubs*

2.10.1. There are at present 13 Flying Clubs in India, subsidised by the Government. They are administered by their own elected Managing Committees. These Flying Clubs are autonomous bodies, registered either under the Indian Companies' Act or the Indian Co-operative Societies' Act. In most cases, they are provided free hangarage and other office accommodation by the Government sufficient for their needs. The Clubs have been divided into 4 classes for purposes of Government subsidy. The amount of subsidy depends on their classification based on the number of Flying hours of training imparted in a year. The Government of India also gives them additional monetary assistance as flying subvention for every hour of flying done.

2.10.2. The scope of training in the flying clubs is at present limited to

(a) Hobby flying,

(b) Private Pilots' licence, and

(c) National Cadet Corps Flying.

Training for Commercial Pilot's licence ('B' Licence) in the Flying Clubs was discontinued and centralised at the Civil Aviation Training Centre. In a few cases, however, the Pilots who had started their training in the Flying Clubs for Commercial licence prior to the imposition of the above restrictions, were allowed to continue their training at the Flying Clubs. The number of such trainees is small and it is expected that no future claimants for this concession will be forthcoming.

2.10.3. The Government of India have instituted an 'Intermediate' course at the Civil Aviation Training Centre open to pilots with 100 hours' previous flying experience. Applicants for this course are those who have obtained the requisite experience at the Flying Clubs. All private fliers have been permitted to fly at concessional rates at the Flying Clubs to the extent of 100 hours in the first year and 50 hours in each subsequent year at subsidised rates. The rates are Rs. 10/- per hour for trainees below 28 years of age and Rs. 25/- per hour for trainees above this age. The present machinery of the Flying Clubs is, therefore, designed for the training of such pilots. They do not have adequate facilities for proper ground training, equipment for synthetic flight training, or audio-visual education in aeronautical subjects. The Flying Clubs are also experiencing at the present time a great shortage of Instructors, which has resulted in a general lack of supervision of private flying. The shortage of instructors in the Flying Clubs is generally attributed to the fact that trained Commercial Pilots are absorbed by the airlines where they get more attractive service conditions than what the Flying Clubs can offer. The total strength of the Instructors is also being depleted due to the same reason with the result that in most of the Flying Clubs serious difficulties are being experienced in completing the Flying quota allotted to them for National Cadet Corps trainees.

2.10.4. While examining the existing training system in the Flying Clubs. the Committee became aware of the fact that the training imparted to the pupils was inadequate in many respects. The pupils get training at varying intervals with the result that continuity of training is lost, and a great deal of 'dual' flying before 'solo' becomes necessary. After 'solo', very little 'dual, instruction is given and trainees remain unchecked for long periods. They are, therefore, likely to acquire undesirable flying habits. The pupils acquired very scanty knowledge about the technical aspects of the aircraft they fly. The knowledge of air legislation and various subjects allied to aeronautics is also poor. All these could directly be attributed to the lack of sufficient and trained instructors at the Clubs. Inadequacy of ground equipment mentioned above is also a contributory factor. The casual atmosphere in the Clubs is responsible for the general lack of discipline amongst the pupils and obviously, the clubs cannot fulfil the role of a school.

2.10.5. The Committee has arrived at the conclusion that the following definite role of training may be allocated to the Flying Clubs:—

(*i*) Hobby flying to the extent available under the subsidy scheme (100 hours in the first year and 50 hours in each subsequent year).

(*ii*) Training of National Cadet Corps cadets to the extent required, under the instructions of the National Cadet Corps Directorate.

(*iii*) Training for obtaining the Private Pilots' licence with a view to providing material for recruitment to the Commercial Pilot's course at the Flying School.

2.11. *Flying Instructors from the Indian Air Force*

2.11.1. The Committee was given to understand by the Air Force representative that 10 or 12 Flying Instructors with adequate experience and maturity may be made available by the Air Force for absorption in a permanent cadre of the D.G.C.A., but not without certain amount of difficulty. He also emphasised that since the Indian Air Force Instructors to be so released, belong to the permanent cadre of the Defence Services, it would not be desirable to release them for absorption by non-governmental organisations like the Flying Clubs. These arrangements have to be approved by the respective Ministries and the Departments concerned with particular reference to the terms and conditions of their service.

2.12. *Recommendations*

2.12.1. Nothing should be done which might have the effect of throttling the development of the Flying Club movement. There is no need to institute any system of selection for entry into the Flying Clubs, the only requirement being that flying members fulfil the medical fitness standard prescribed for the private pilot's licence.

2.12.2. The Flying Instructors released by the Indian Air Force should primarily be utilised for instructional duties at the Flying School and to augment the Instructors' strength of the Flying Clubs by sending them to the Clubs on deputation. This, in itself, will not, of course, fill the entire gap of the shortage of Instructors at the Flying Clubs. The offer of the Air Force should be availed of and fully utilised. Air Headquarters may be approached to release a definite number of Instructors, say 10 or 12.

2.12.3. All the existing Instructors at the Clubs and future aspirants for Instructors Rating should be sent to the Indian Air Force Instructors' Training School at Tambaram, under arrangements with Air Headquarters.

2.12.4. The role the Flying Clubs are to play in providing suitable materia for training at the Flying School has to be laid down on the lines indicated in paragraph 2.10.5 above.

2.12.5. The present system of permitting Assistant Pilot Instructors without Instructor Rating to impart instruction in flying should be discontinued and in their place, only Assistant Pilot Instructors holding current Instructor's Rating trained either at Tambaram or at any other place where an approved training can be given to them should, in future, undertake training of pilots in the Clubs.

2.12.6. The Committee does not recommend the provision of elaborate ground equipment such as synthetic flight trainers, etc. at the Flying Clubs. It would be sufficient if the Flying Clubs equip themselves to provide basic knowledge of engines and airframes, elementary navigation and elementary knowledge of Indian Aircraft Rules and Meteorology for qualifying candidates for Private Pilots' licence. Provision of lecture rooms for ground lectures will have to be made. The Flying Instructors trained at Tambaram would be in a position to undertake the class-room work in addition to their duties as Flying Instructors. It can be reasonably expected that a Flying Instructor can do up to 60 hours of instructional flying per month and still devote an additional two hours or so per day for ground lectures, filling up pupils' dossiers and other documentation.

2.12.7. The Flying Instructors of the Clubs should be subjected to routine checks once a year and a refresher course once every three years. The machinery for carrying out the routine-checks on the Instructors will comprise of the same two Government Inspectors of Flying, who will also be deputed for checking for selection of candidates for entry into the Flying School.

2.12.8. Trainees holding the Student Pilot's Licence should be debarred from exercising any voting rights in the management of the Clubs until they qualify as Private Pilots. This will ensure that the Instructors of the Clubs can enforce discipline and inculcate respect for the rules and regulations in the minds of the trainees. This provision will also keep them from the party politics in the Clubs.

2.12.9. The Clubs will be required to maintain dossiers giving details of training imparted and progress of each trainee for every flight undertaken, in respect of those trainees who aspire to obtain Private Pilots' licences.

2.12.10. The Government may agree to pay Flying Subvention on all aircraft owned by the Clubs or loaned to them by the Government up to 1500 kgs. gross weight provided they are capable of being used for dual instructional purposes.

2.13. *Avoidance of infructuous Flying*

2.13.1. In order to minimise expenditure on infructuous flying at the Flying Clubs, the Committee examined the possibilities of limiting flying training only to those persons who are:—

(a) Physically fit; and

(b) Temperamentally suited.

It can be seen that the first requirement can be easily met by insisting on a Certificate of Medical fitness required for a Private Pilot's licence before a trainee is allowed flying facilities. Isssue of a student Pilot's Licence where the medical standards are the same as for Private Pilots would ensure compliance with (a) above.

2.13.2. Temperamental suitability is affected by:—

(i) Flying aptitude,

(ii) Any inherent tendency not conducive to safe flying.

2.13.3. *Flying aptitude*

Normally, a trainee of average ability should not require more than 20 hours of 'dual' instructions before going 'solo' on a light aircraft. The Government may, therefore, limit initial 'dual' to a figure of 20 hours provided that if the pupil is specially qualified or otherwise suited and recommended by the Chief Instructor that he is likely to go 'solo' in the next 5 hours, an additional 5 hours may also be allowed, thus in such cases, making a total of 25 hours of dual instruction before 'solo'. All those trainees who do not qualify for 'solo' within 20 or 25 hours as stated above need not be allowed any further flying in the Flying Clubs at subsidised rates. A person who has the means and wishes to fly need not be stopped from flying if he is willing to fly beyond these limits at non-subsidised rates. The present practice adopted by the Civil Aviation Department to permit 25 hours of 'dual' flying with an additional 5 hours on the recommendations of the Chief Pilot Instructor at subsidised rates is considered to be rather lenient, involving avoidable expenditure to Government in subsidising flying of those pupils who are not likely to make average pilots.

2.13.4. *Any inherent tendency not conducive to safe flying*

It may be difficult to assess such tendencies in a trainee unless a trainee has been in the club for a considerable time and has been observed to do manoeuvres recklessly and in disregard of rules for safety. The Committee is of the opinion that it should be the responsibility of the Chief Instructor of every Club to record such tendencies in a trainee and report to the Director General of Civil Aviation, who may, if necessary, withdraw the licence and/or suspend his flying temporarily or permanently.

SECTION 'C'

SELECTION OF TRAINEES

3.1 The method now being employed for the selection of pilot trainees is considered by many to be too rough and ready to produce the desired results, *viz*., a good airline transport pilot. It was suggested that if a system of stringent screening during the selection stage was introduced, the wastage during training period could be substantially reduced. It is to prevent this wastage of money, time and effort on training of pilots that many of the better informed witnesses advised the adoption of a flying aptitude test in addition to the test of personality, general knowledge, intelligence, alertness and so on.

3.1.1. The current system of selection is through an interview by a panel of representatives of the Director General of Civil Aviation, Indian Airlines Corporation, Air India International and the Civil Aviation Training Centre. The candidates are also required to write an essay on a simple topic. This system is devised to test all the qualities above stated except his flying aptitude. The view is widely held that however brilliant a boy may be, he need not necessarily make a good airline transport pilot. The aim, therefore, should be to evolve a simple test of flying aptitude and if it can be done without cost to the Exchequer, so much the better.

3.2 *The Air Force Method of Selection*

3.2.1. The Indian Air Force have an elaborate set up at Dehra Dun where candidates for entry into the Indian Air Force are tested by putting them through an intensive procedure occupying four and half days. The tests are devised to fall into three broad groups. The first tests the candidate's officer-like qualities, the second his intelligence and the third his flying aptitude. Flying aptitude in the Air Force is tested on the ground by means of a battery of electromechanical gadgets and visual aids. The Air Force find that their rejection rate at the end of these tests is as high as 9 for every 10 candidates tested. In other words, to select 30 flying recruits of the required grading no less than 300 candidates have to be put through these elaborate tests. The process is continuous, groups arriving at the Indian Air Force Selection Board, Dehra Dun, every 4½ days where they are accommodated and fed.

3.2.2. A suggestion has been made that Civil Aviation might draw their trainees from the same source and accept a lower grading than the minimum accepted for entry into the Air Force. The general feeling is however against acceptance of second best material for civil aviation and that the authorities concerned should either devise their own methods of testing or use Indian Air Force's aptitude test equipment which is expected to be established in the near future on regional basis.

3.2.3. It should be made clear that for entry into Civil Aviation the system of testing flying aptitude on the ground by means of synthetic devices is not generally employed, though the system is widely adopted for entry into the Air Forces. In the Netherlands, for example, where the Government runs the only regular school in Western Europe (including the United Kingdom) for training commercial pilots, flying aptitude test is given in the air. Each candidate is taken up for 10 hours merely to test his aptitude, not for giving instruction in flying The same procedure is followed in the U.S.S.R. They claim and this view is shared by the Committee that this direct method provides the surest method of finding out whether the candidate has a liking for flying, whether he has the feel for it and whether his reaction and powers of absorbing instruction are of the required degree. These tests are done at the cost of the State and, as mentioned earlier, if such a system were adopted at the Flying School, and even if the wastage rate were only half of that experienced in the Air Force, 150 candidates would have to be given 10 hours of flying each and this would throw an unacceptable burden not only on the Exchequer but also on aircraft and manpower resources of the Flying School.

3.3. *Flying Aptitude Test.*

3.3.1 A neat way by which this might be done is to use the machinery of the Flying Clubs. Reference has earlier been made to the urgent need for standardising elementary flying training at the Flying Clubs. Not only would Flight Instructors and Assistant Flight Instructors be required to hold the appropriate Flight Instructor's ratings but they would also be required to undergo an approved course of Flight Instructor training. Mention has been made that the only institution of this kind is run by the Indian Air Force at Tambaram and the Committee has strongly recommended that all Flight Instructors employed by or allotted to the Flying Clubs should be sent for initial and refresher training to that School. There the Flight Instructors are taught how to evaluate a pupil's training progress which, among other things, entails the maintenance of a dossier in respect of each pupil, in which are entered lesson by lesson the exercises practised, the pupil's reactions, power of comprehension, rate of progress and of course his deficiencies. It is essential to adopt the same system at the Flying Clubs. By the time a Club pupil has completed his training to the stage of obtaining his private pilot's licence, the Club would be in possession of a very complete history of the candidate's flying aptitude. Such a dossier could assist the selection Board in assessing the pupil's flying aptitude. The Committee believes that for purposes of selection from candidates with previous flying experience, reference to the dossiers to be maintained by the Flying Clubs plus a short test undertaken by a person authorised to do so would meet the requirements.

3.3.2 The above system envisages that entry to the Flying School would be restricted only to holders of Private Pilot's licences and National Cadet Corps cadets who have completed not less than 20 hours of 'Solo' flying, this being the minimum under the revised licensing rules for qualifying for private pilot's licence. It might be mentioned in passing that to acquire 20 hours of solo flying experience, a candidate might have to put in 50 hours or more of total flight time at the Flying Club.

3.3.3. It is expected that even if we were to restrict entry to the Flying School to candidates with previous flying experience the field of selection would be so large that no difficulty is likely to be experienced in selecting the requisite material both in quantity and quality. Some members have, however, pointed out that such a course would have the unfortunate effect of debarring deserving candidates from places and Universities remote from

Flying Clubs from applying. They believe that recruitment should be thrown open even to those who may not have seen an aeroplane at close quarters. The problem arises if such persons were also made eligible to apply, how to test their flying aptitude. It would be impracticable to require them to proceed for a lengthy course of training for the private pilot's licence at a Flying Club at their own cost in order that their flying aptitude might be tested. Not only would such delay upset the training schedule at the Flying School but also may result in sending a large number of boys from remote areas to join the nearest Flying Club without any certainty that they might ultimately be taken into the Flying School. On the other hand, it would be far too expensive to give free flying at the Flying School merely to test a pilot's flying aptitude, as each such pupil may have to be given upto 10 hours of flying before conclusive results can be obtained.

3.3.4. If the suggestion to admit applications from persons without previous flying experience is accepted, the only method open would be to send such boys to the nearest regional Indian Air Force testing centre for testing their flying aptitude. It is understood that in the near future the Indian Air Force are setting up three regional centres besides the one at Dehra Dun for the purpose of testing National Cadet Corps candidates for entry into the Indian Air Force.

3.4. Recommendations

3.4.1 The Committee makes the following specific recommendations:—

3.4.1.1 *Flying School*—For entry to the Flying School the following procedure be adopted :

(a) *Age limits*—An applicant must be between the ages of 17 and 21 on the date of commencement of the course.

Relaxation of age—A relaxation of two years in the upper age limit may be made in case a candidate.

(i) has 20 hours of 'Solo' flying to his credit,

(ii) possesses a degree/diploma/licence in engineering or a post-graduate degree in Physics or Mathematics,

(iii) belongs to a Scheduled Caste/Tribe.

(b) *Educational qualifications*—Higher Secondary or equivalent, with Physics and/or Mathematics.

(c) *Initial screening of applications*—By the Director General of Civil Aviation Secretariat.

(d) *Intelligence tests.*—Through a written examination consisting of—

(i) a paper on simple essay, general knowledge and current affairs and

(ii) a paper to test mechanical aptitude, simple Mathematics and intelligence. The papers will be set by the Selection Board and the written tests will be conducted simultaneously at a number of centres throughout India where machinery exists for invigilation. Such facilities exist at Bombay, Delhi, Allahabad, Patna, Calcutta, Madras, Bangalore, Hyderabad and Nagpur. The answer papers will be evaluated by the Selection Board. The pass and aggregate percentages in each paper will be prescribed by the Director General of Civil Aviation for the above tests.

(e) *Personal qualities test*—Through an interview by a Selection Board at five centres, namely, Delhi, Calcutta, Madras, Bombay and Allahabad.

(f) *Medical fitness*—The medical examination should be undertaken only in respect of those candidates who have been finally approved by the Selection Board and before the candidates are actually sent to the Flying School. The medical standard should be upto the requirements of Airline Transport Pilot's licence.

(g) *Flying aptitude tests.*—Direct entrants to the Flying School or applicants with less than 20 hours solo flying experience shall be tested for flying aptitude at the nearest Indian Air Force testing centre.

Candidates with 20 or more hours of solo flight time will be tested by a Flying Inspector or a person authorised by the Director General of Civil Aviation to test their flying aptitude as per details given in paragraph 3.3.

(h) *Composition of Selection Board.*—The Selection Board will consist of representatives of Indian Airlines Corporation, Air India International, Director General of Civil Aviation and the Flying School.

3.5 Selection of Trainees for the Flying Clubs

3.5.1. There is no need to institute any system of selection for entry into the Flying Clubs, the only requirement being that Flying members fulfil the medical fitness standard prescribed for the Private Pilot's licence. Detailed recommendations on restrictions to avoid infructuous flying have however been suggested in Section 'B' dealing with Flying Clubs.

ACKNOWLEDGEMENT

The Committee is indebted to the I.A.F., A.I.I., I.A.C, the independent airlines, flying clubs and individuals, who were good enough to provide facilities, answer the questionnaire or give evidence before the Committee.

The Committee also wishes to thank the members of the staff who have worked hard to complete the secretarial work within the allotted time.

K. M. Raha, Chairman.

H. C. Dewan, Gp. Capt., Member

P. D. Byramji, Member

R. P. Huilgol, Member

B. P. Singh, Member

B. M. Gupta, Member

M. C. Dikshit, Member/Secy.

NEW DELHI,
The 31st January, 1958.

APPENDICES

सत्यमेव जयते

APPENDIX—I.

No. 15-A/54-57

GOVERNMENT OF INDIA

MINISTRY OF TRANSPORT & COMMUNICATIONS

(Department of Civil Aviation)

Dated New Delhi, the 25th Oct. 1957

ORDER

In pursuance of the assurance given by the Minister for Civil Aviation in the Lok Sabha on August 3, 1957, to set up a Committee to review the existing facilities for the selection, training and licensing of Civil Air Pilots, the Central Govt. is pleased to appoint a Committee composed of the following:

1. Shri K. M. Raha, Deputy Director General Civil Aviation, New Delhi—*Chairman*
2. Group Capt. H. C. Dewan, Director of Training, Air Headquarters, New Delhi—*Member.*
3. Capt. P. D. Byramji, Divisional Operations Manager (Training), Air India International, Bombay—*Member.*
4. Capt. J. A. Chitamber, Chief Operations and Training Manager, Indian Airlines Corporation, New Delhi—*Member.*
5. Shri Bhadreshwar Prasad Singh, Chairman, Hind Provincial Flying Club, Lucknow—*Member.*
6. Shri B. M. Gupta, Principal, Civil Aviation Training Centre Allahabad—*Member.*
7. Shri M. C. Dikshit, Director of Training & Licensing, Civil Aviation Department, New Delhi—*Member/Secretary.*

2. The Committee shall examine the existing system of selection for admission for training in flying at a flying club and for admission to the Civil Aviation Training Centre at Allahabad and recommend measures for improving the methods of selection for admission to these institutions.

3. The Committee shall also examine the existing scheme of training of Civil Air Pilots at the Civil Aviation Training Centre, Allahabad, and recommend measures for its improvement with particular reference to the following :—

(a) The procedure for eliminating trainees who do not show sufficient aptitude or promise at suitable stages;

(b) Any special checks which may be required before the pilots passing out of the school are allowed to be employed by any of the operators in the country;

(c) Standard of present 'B' Licence vis-a-vis the International Civil Aviation Organisation Senior Commercial Pilot's Licence and the International Civil Aviation Organization Airline Transport Pilot Licence and whether subject to local needs and conditions Indian licences should not conform to the International licences.

4. The Committee shall also examine the existing schemes of further training of the Civil Air Pilots employed by the different operators and recommend measures for effecting improvements in the system. In making their recommendations, the Committee shall have regard to the need for maintenance of the existing services, financial limitations particularly of foreign exchange, equipment and technical personnel.

5. The membership of the Committee will not be a wholetime job and the members will have to work on the Committee in addition to their normal duties.

6. The Committee shall submit its report to Government not later than 31st December, 1957.

(Sd.) B. N. JHA,
Secretary to the Government of India.

APPENDIX-I (ii)

No. 15-A/54-57

GOVERNMENT OF INDIA
MINISTRY OF TRANSPORT & COMMUNICATIONS
(Department of Civil Aviation)

Dated New Delhi-2, the 14th December, 1957

ORDER

The Central Government is pleased to direct that Captain R. P. Huilgol of the Indian Airlines Corporation shall be, and shall be deemed to have been, a member of the Committee to review the existing facilities for the selection, training and licensing of Civil pilots appointed *vide* the Order of the Central Government in the Ministry of Transport and Communications (Department of Civil Aviation) Order No. 15-A/54-57, dated the 25th October, 1957, in place of Captain J. A. Chitamber, Chief Operations and Training Manager.

The Central Government is also pleased to grant an extension of one month for the Committee to submit its report to Government. The report should now be submitted not later than the 31st January, 1958.

(Sd.)-T. R. MANTAN,
Deputy Secretary to the Government of India.

No. 15-A/54-57. *Dated New Delhi-2, the 14th December, 1957.*

Copy forwarded to :—

1. Shri K. M. Raha, Deputy Director-General of Civil Aviation, New Delhi.

2. Group Capt. H. C. Dewan, Director of Training, Air Headquarters, New Delhi.

3. Capt. P. D. Byramji, Divisional Operations Manager (Trg), Air India International, New India Assurance Building, Fort, Bombay-1.

4. Capt. J. A. Chitambar, Chief Operations and Training Manager, Indian Airlines Corporation, Thapar House, Janpath, New Delhi.

5. Shri Bhadreshwar Prasad Singh, Chairman, Hind Provincial Flying Club, Lucknow.

6. Shri B. M. Gupta, Principal, Civil Aviation Training Centre, Allahabad.

7. Capt. R. P. Huilgol, Operations Manager, Indian Airlines Corporation, Thapar House, Janpath, New Delhi.

8. Shri M. C. Dikshit, Director of Training and Licensing, Civil Aviation Department, New Delhi.

9. Director General of Civil Aviation (Shri L. C. Jain, ICS) New Delhi.

10. Ministry of Defence.

11. Department of Parliamentary Affairs.

12. Air India International, Bombay.

13. Indian Airlines Corporation, New Delhi.

14. Information Officer (Shri R. M. M. Menon) New Delhi, in continuation of this Ministry's endorsement of even number dated the 25th October, 1957.

By order, etc.

(Sd.) D. R. KOHLI,

Under Secretary to the Government of India.

APPENDIX—7.

GENERAL AIR TRAINING LIMITED.

Commercial Pilot Training

At the present time airlines are faced with a serious problem of obtaining suitable young men with Commercial Pilot’s Licences who are capable of being trained to airline standards as eventual Captains.

Whereas in the past the R.A.F. was the training ground for airline pilots a growing demand coupled with a reduction in the size of the R.A.F. has now shown this source of supply to be inadequate.

At the same time the high cost of obtaining a Commercial licence has discouraged the right type of young man from making a career in Civil Aviation, and the cost of maintainig a Flying School has discouraged operators from undertaking their own training although in recent months many have been forced to consider the possibility of doing so.

As a means of providing a regular supply of young qualified pilots of suitable educational background, the following flying training plan is offered as a service not only to airline operators but also to young men who wish to make civil aviation their career with a guarantee of employment with an airline operator.

General Air Training Limited, in conjunction with their Bankers, United Dominions Trust Limited, have devised a plan providing for a flying training course to Commercial Pilots Licence standard with instrument rating, which normally occupies twelve months and is both residential and full time. By this Plan any heavy expense to the prospective commercial pilot is avoided and the cost of training suitable pilots is substantially reduced.

Courses for Flight Navigators’ Licences can be arranged in addition.

The Plan is designed for boys leaving school or other young men wishing to become airline pilots but who cannot afford the heavy cost of training. Applications for training under the Plan will be accepted from boys recommended by an airline operator wishing to participate and who will undertake to offer the boy employment when qualified.

The Company reserves the right to refuse any applicant for training under the Plan without stating reasons for their refusal.

On acceptance the applicant will be entered for the next convenient ‘ab initio’ course at a School approved by the Company and except in special cases, dealt with later, will have to meet the cost of training to Private Pilot’s Licence.

Upon obtaining a Private Pilot’s Licence and on the recommendation of the C.F.I. the pupil will be eligible for further training to Commercial Pilot’s Licence.

In the case of an applicant obtaining his Private Pilot's Licence, General Air Training will arrange a loan from United Dominions Trust Limited to cover the total cost of his training (including messing and accommodation charges) to Commercial Pilot's Licence with Instrument Rating.

This loan will be subject to the following undertakings :—

(1) To repay the total charge for the course, less any initial payment made, over a period of 3 years beginning 12 months from date of commencement or one month after termination of the Course. The amount of each instalment can of course be substantially reduced by the pupil making an initial payment if his means permit.

(2) To effect such insurances as the Company requires, through the Company and to assign the benefit thereof to United Dominions Trust Limited and to maintain these policies at least for the duration of the loan.

(3) To complete the course diligently.

In addition the parent or guardian will be requested to give United Dominions Trust Limited an indemnity.

If at any time during the Course the Chief Flying Instructor reaches the conclusion that the pupil is unlikely to reach the standard required for a commercial pilot, he will advise him accordingly so as to avoid unnecessary expense. In this event the pupil's liability will not exceed the repayment of monies expended upto the date of termination of his course.

Progress reports will be furnished by the school to the Company who will be prepared to make these available to the prospective employers.

The standard rate of pay for a 'Junior' second officer does not allow him to pay his monthly instalments, keep up a satisfactory insurance policy and leave him with sufficient on which to live. In these circumstances and to make the plan workable the employers must agree to make a grant of £1,600 in reduction of the pupil's debt on completion of the Course and guarantee him employment on qualifying.

An alternative arrangement whereby a reduced sum is payable by the operator on completion of training followed by three annual payments would be considered.

In the circumstances where a pupil is unable to meet fees to Private Pilot's licence standard, General Air Tranining Limited, will consider recommending a further loan to pay for 'ab initio' training if an educationa grant cannot be obtained.

To summarise the foregoing, the Plan makes it possible for a young man with limited financial resources to obtain a complete training as a Commercial Pilot at a fraction of the normal cost, and provides a steady flow of Pilots for operators at a cost far below that existing in any country to-day.

COMMERCIAL PILOT TRAINING PLAN

(1) ***Cost***

(1) ***Payable by pupil***

	£ sh. d.
(i) Registration Fee	10—0—0
(ii) To cost of obtaining Private Pilots Licence .	304—0—0
TOTAL . . .	314—0—0

(2) *To Commercial Pilot's Licence and Instrument Rating*

	£ sh. d.
(i) Cost of Commercial Pilot's Course . .	1,522—12—0
(ii) Accommodation and Messing . . .	165—0—0
(iii) Twin Engine Conversion and Instrument Rating Course	1,086—0—0
(iv) Accommodation and Messing . . .	69—0—0
TOTAL . .	2,842—12—0
Deduct grant from Operator payable on completion of Course *i.e.* 10 months after commencement of Course	1,600—12—0
TOTAL .	1,242—12—0

(2) *Method of Payment* :

Payable by 36 equal monthly payments of £34-10-4d. the first to become due 12 months after commencement of course.

GENERAL AIR TRAINING LIMITED

Helicopter Conversion Plan

In addition to the plan devised for the training of Commercial airline pilots, a similar plan is offered to helicopter operators unable at the present time to obtain commercial pilots with a helicopter rating endorsed on their licences.

In the past operators have obtained pilots from two sources :—

(1) From the Navy or R.A.F. , and

(2) From commercial fixed wing pilots who have been converted at the employer's cost to helicopters.

Here again the source of supply from the services is uncertain and in any event is failing to keep pace with the increased demand by operators, but in addition there is such a shortage of trained helicopter pilots that there is a tendency for them to go from one job to another (Some in breach of contract rather than stay with one employer for any length of time). This has the effect of making employers unwilling to bear the cost of training when they may not have the use of the pilot for sufficient time to write off the training cost. On the other hand few pilots can afford to pay for the conversion course themselves.

The plan provides for a conversion course which normally occupies six weeks and is again residential and full time. Comprehensive flying and ground instruction is given to the standard required for a helicopter rating on a Commercial Pilot's Licence. Instruction will be given on an elementary type and, where required, on an advanced type.

Applications for training under this plan will be accepted from pilots sponsored by established helicopter operators willing to accept the terms outlined.

Acceptance of each applicant will be conditional upon similar undertakings to those sent out for Commercial Pilots.

On acceptance, a loan can be obtained from United Dominions Trust Limited to meet the cost of training.

Since the duration of the course is comparatively short, the sum of money involved less, and the earning capacity of the pilot on qualifying greater, it might be argued that the full onus of repayment should rest with him, but is anticipated that most operators would prefer to sponsor fixed wing pilots with considerable flying experience and that these pilots are likely to be older and therefore to have greater financial responsibilities than boys trained under the Commercial Pilot's Plan. Therefore employers will be required to make a payment of £300 in reduction of the debt on completion of the course and also to contribute £200 per annum, payable by equal monthly instalments, towards the repayment for three years or so long as the pilot remains in their employ whichever is the lesser.

If the pilot leaves his sponsor's employ in breach of contract or through behaviour or for any other reason, the onus of meeting the entire payment will rest with him and the operator will be relieved of any further liability.

Procedure will be identical with that for commercial pilots except that no private pilot's course will be necessary and signing of the contract will precede commencement of training.

Helicopter Conversion Course

Cost.

(*1*) *Payable by Pilot.*

	£	sh	d
(i) Registration fee	10	0	0
(ii) Accommodation and messing	31	0	0
Total	£41	0	0
(2) *To cost of Course*	£1,925	11	0
Deduct grant from Operator payable on completion of Course *i.e.* 2 months after commencement of course	300	0	0
Total	£1,625	11	0

(*3*) *Method of Payment.*

The Pilot and Operator to make 36 equal monthly payments of £28 9sh 9d. and £16 13sh 4d. respectively, the first payment to become due 3 months after commencement of course.

NOTE.—Several enquiries have been received regarding the eligibility of boys who have left school and who may have had flying experience.

Each case is considered individually and the cost of the course will vary with the amount of instruction considered necessary.

The minimum age at which a boy would be considered for training is 17 and it is unlikely that anyone over the age of 28 would find a sponsor.

It is important to realise that no one can be accepted for training unless he is sponsored by an airline operator and whilst this company will do everything possible to obtain a sponsor for suitable applicants it is pointed out that the scheme is designed to meet long term requirements, and that acceptance of pupils for training will be dependent on the sponsors' demands.

If you are considered suitable you will be advised in due course of the names of airline operators who have vacancies and to whom your application will be forwarded.

GENERAL AIR TRAINING LIMITED

COMMERCIAL PILOT TRAINING PLAN

In conjunction with

United Dominions Trust Limited,
Bankers,

United Dominions House, Eastcheap, E.C. 3.
(AVIATION DIVISION)

Full Name ....Date of Birth..............
Address (State whether permanent or temporary)........................
..................................Telephone No..................
Nationality...........................Married or Single............
Bankers..........................Address ....
Where Educated (Give dates).......................................
Do you hold G.C.E. Ordinary/Higher Level?.............................
Subjects passed...
Other examinations passed..
Sport or Games...
National Service.....................Rank on Release................
Flying experience (if any)...
Are you medically fit?................Are you prepared to attend for an interview and full medical examination in London at your own expense
....

TO :

General Air Training Limited,
1, Great Cumberland Place,
London W. I.

I have read your brochure setting out details of the Commercial Pilot Training Plan and wish my application to be considered. I understand that this proposal is subject to the terms contained in the brochure and that the particulars given herewith will form the basis of any future contract of loan arranged with your Bankers—United Dominions Trust Limited—and I further warrant these particulars are true.

*I am prepared to contribute £........towards the charge for the course upon acceptance. Will you please, therefore, quote me revised figures for an advance of the balance.

(Signature of Applicant)............
(Date) ....

Please send your Birth Certificate with this form.
If *over* 21, complete form to * below.

To be completed by parent/guardian

*Full Name..........................Nationality....................
Private Address..........................Telephone No.............
Business Address..........................Telephone No. ....
Profession or Occupation..
Bankers..........................Address ....
....

I have read the brochure describing the Commercial Pilot Training plan and I hereby consent to..............undergoing a Course of instructions as specified therein on the terms and conditions of payment as therein provided.

Furthermore I am prepared to act as a surety for the performance of the obligations undertaken by..
Signature of Parent or Guardian......................................
Date ....

---

*Delete this paragraph if inappropriate.

APPENDIX 8

HISTORY OF THE TRAINING OF COMMERCIAL PILOTS IN THE NETHERLANDS

From "Rijksopleiding" (Government Training) to "Afdeling Rijksluchtvaart school" (Netherlands Government Civil Flying School) of the "Rijksluchtvaartdienst" (Department of Civil Aviation).

"Safety first" is the foundation on which commercial aviation is built and in which the human factor—the commercial pilot—plays the main part. This is why the best possible attention has been paid right from the initiation of commercial aviation to the selection of suitable candidates and the training of such candidates as commercial pilots.

At first K.L.M. (Royal Dutch Airlines) recruited their pilots from military aviation. Only a short complementary training was required to render the selected military pilots suitable for their new function.

According as the requirements put to the commercial pilot as a result of the rapid development of the commercial aircraft and the means of navigation became more stringent it became more difficult to recruit the required number of men from this source. Moreover not every military pilot was found to be a suitable commercial pilot and the requirements laid down especially for military pilots often differ from those applying to a commercial pilot.

A special school for airline pilots was therefore of great importance for the maintenance and extension of Netherlands commercial aviation.

The idea of creating a separate direct training for commercial pilots already existed early in the twenties. It was not, however, carried into effect until 1931, when the Government decided to establish a "Government training for commercial pilots"

This was not a special school for commercial pilots in the meaning of an independent school with personnel and material of its own; on the contrary, existing institutions with their personnel and material each attended to the training. The "Kweekschool voor de zeevaart" (Sea training school) at Amsterdam accommodated the pupils and attended to the theoretical schooling the "N. V. Nationale Luchtvaartschool" (National Flying School) took charge of the elementary training and K.L.M. attended to the continuation thereof.

The "Kweekschool voor de Deevaart" was inserted because it was considered that there was a great likeness between the requirements with which officers of merchantmen had to comply and those put to commercial pilots on long stretches. Consequently the candidates for commercial flying followed a combined sea-air navigation course.

Whilst reading as officer for the ocean-going trade they received instruction in specific aviation subjects as well as flight instruction at Schiphol Airport.

When the apprentice commercial pilots had done a number of hours independent flying with the light trainers of the "N.V. Nationale Luchtvaart-school" their training was continued on the Koolhoven FK 43, a taxi plane then in use with K. L. M. after the final examination of the "Kweekschool", which they went in for after two years, the pupils received a complementary practical and theoretical training at Schiphol Airport, and the "Rijksopleiding tot bestuurder van verkeer svliegtuigen"(Government training for commercial pilots) was concluded six months later by their going in for the examination for a B licence (licence qualifying as a commercial pilot), for navigator second class and for wireless operator third class.

In practice, however, the combined training for sea and air navigation did not prove entirely satisfactory, nor did the combination of commercial aviation company and training company. After some years the close tie between sea and air training was loosened. At the "Kweekschool voor de Zeevaart" separate class was created for prospective commercial fliers, who need only pass the aviation examinations.

However, there were then still objections to the "Rijksopleiding" both on the part of the "Kweekschool" and of K.L.M., the former wanting to train seamen only, the latter desiring to be carriers only. The question as to the best manner of training commercial pilots again became a matter of serious study, which, however, was interrupted by world war II.

After the liberation in 1945 the Government considered it as a matter of great national interest that civil aviation should be restarted as soon as at all possible.

On the Government's invitation the then President of K.L.M., Dr. A. Plesman, on 17th October, 1945, set forth to various authorities what activities that Company intended to develop in the next few years and the consequent need of commercial pilots. It was stated that K.L.M. at that time had 52 pilots available and would need 300 pilots in 1948. Though as a matter of course the number of men required could not possibly be made available in so short a period it was incontestable, on the basis of the data supplied by Dr. A. Plesman, that the introduction of a special training for commercial pilots was a matter of the greatest urgency.

Consequently, the "Rijksluchtvaartschool" was founded as at 1st January, 1946; this was a special school for commercial pilots, with personnel and material of its own.

When on 8th April, 1946, the training of the first group, consisting of 78 pupils, was taken in hand by the "Rijksluchtvaartschool" at the airport of Gilze-Rijen situated between Breda and Tilburg, the fleet consisted of the following types:

(*a*) Tiger Moth for elementary training;
(*b*) Harvard for secondary training;
(*c*) Beechcraft D 18-S for final training.

At first training at Gilze-Rijan took place both with Tiger Moth and with Harvard and Beechcraft; for the elementary training in the Tiger Moth use was made of a stretch of grassland, next to the runways, which han specially made for the purpose.

It was soon found, however that training with the slow Tiger Moth aircraft could not take place on one site with and at the same time as the Harvard and Beechcraft training flights with adequate safety conditions.

In view hereof an other airfield had to be selected for the elementary training and for this purpose Ypenburg airport in the close vicinity of the Hague, was selected.

The training school established there, including theoretical instruction, started work on 5th November, 1946, with the training of the second group now comprising 81 pupils—which had been admitted to the "Rijksluchtvaartschool".

For the rest both schools also had a linktrainer section.

In the course of 1955 and 1956 the theoretical school, the secondary and final training of pilots and furthermore all services which had been accommodated at the Gilze-Rijen training school were transferred to Eelde (south of Groningen), while in 1957 the elementary training school will be transferred to Zestienhoven airfield (on the main road Rotterdam—The Hague). The "Rijksluchtvaartschool" will then be definitely established at its ultimate locations.

THE TRAINING FOR COMMERCIAL PILOTS AT THE "AFDELING RIJKSLUCHTVAARTSCHOOL VAN DE RIJKSLUCHTVAARTDIENST"

(School of the Department of Civil Aviation)

The training at the "Rijksluchtvaartschool" is adapted from beginning to end to the requirements of modern air transport. It provides the pupil with a wide sound basis on which they can later on build their career as a commercial pilot and captain.

The "Rijksluchtvaartschool" considers it as a privilege that by giving a good training they can do their part to carry into effect the ideal of the safest possible commercial aviation.

As of logical result of the high requirements made to the profession of a commercial pilot those for admission to the "Rijksluchtvaartschool" are also at a certain level, not only for the sake of safety in commercial flying but also in the interest of the pilot himself. In addition to general requirements in regard to age and previous education ("H.B.S.-B" or a corresponding diploma) candidates for the training must comply with various special requirements. In this connection they are to submit to a number of selection tests, namely:—

(*a*) a medical test

(*b*) a character test

(*c*) a test to their aptitude for piloting aircraft.

On the strength of the data obtained during this selection procedure the "Commissie van Aanneming" (Admission Committee)—consisting of aviation experts—decides which candidates qualify for recommendation to the Director-General of the "Rijksluchtvaartdienst" for admission to the "Rijksluchtvaartschool".

The training of a commercial pilot takes about 2½ years, during which the programme listed below is completed.

During the first six months theoretical instruction is given in the following subjects, which are indispensable for the future commercial pilot:

Flat navigation and knowledge of maps, wireless and radar navigation and wireless communication, meteorology, compass instruction, aircraft, engines, instruments, aviation laws, sound and light signals.

At the same time a course of wireless telephony is given; the examination for the licence of wireless telephonist is held after 5 months only.

Subsequently the training for practical flying is started, which is in three phases: elementary instruction, secondary instruction, final instruction.

For the elementary instruction (on the airfield of Zestienhoven near Rotterdam) the Tiger Moth is still being used. This well-known biplane will, however, shortly be replaced by a modern single-engined type.

For the secondary flying training, training planes of the types North American "Harvard" and SAB "Safir" are available, whilst the final training is given on the Beechcraft D 18-S type. This latter is a twin-engined plane.

The flying programme covers at least 302 flying hours for each pupil, according to the following scheme:

	General dual control	General solo	Instrument flying	Navigation dual control	Navigation solo	Night flying dual control	Night flying solo	Total
T. Moth . .	10	20	5	10	35	..	..	80
Harvard . .	18	30	20	..	..	..	..	68
Safir . .	5	2	20	10	25	4	..	66
Beechcraft . .	15	15	25	10	10	5	8	88
Total . .	48	67	70	30	70	9	8	302

During the period of flying instruction the theoretical lessons are also continued, whilst during the entire training period of 2½ years there is regular training in the so-called linktrainer.

No less than 1,400 lesson hours are devoted to the theoretical instruction. After approximately 2 years the theoretical examination for the Senior Commercial Pilot Licence and Airline Transport Licence is held.

Thereafter the basis is laid for the theoretical examination for flight navigator, which study is later completed by the pilots when they are in K.L.M. service. At the end of the training the pupil is ready to go in for the practical examination for the Commercial Pilot licence. The young pilot is then authorized to fly the twin-engined Beechcraft D 18-S independently as well as other commercial aircraft to a total weight of 5700kg. At the same time he may act as a second pilot in larger type commercial craft.

Since 8th April, 1946, the date on which the training of the first group of pupils started, the "Rijksluchtvaartschool" has completed the training of 356 pilots, 336 of whom entered the service of K.L.M. The others were trained for Sabena (1), Garuda Indonesian Airways (5), Air Austria (7) and Royal Dutch/Shell (1), whilst six aircraft construction engineers of Delft Technological University followed a practical and theoretical training.

It follows from the above that not only Dutch boys but also foreigners were trained: one Belgian, seven Austrians and five Indonesians.

The fleet of the "Rijksluchtvaartschool" consists of 62 planes, namely:

23	Tiger Moth
1	Fokker S-11
8	Saab "Safir"
18	North American "Harvard"
12	Beechcraft D 18-S

During their training period the pupils are accommodated in modern living quarters.

The establishment of the "Rijksluchtvaartschool" comprises 279 men, consisting of flight—and linktrainer instructors, teachers, technical, administrative and housekeeping personnel.

Cost of Training

Young student pilots of Netherlands nationality being trained for K.L.M. Royal Dutch Airlines, only pay the cost of board and lodging—totalling to Dfl. 3600,—as the Netherlands Government pays for the theoretical and practical training. These Netherlands students, in return, bind themselves for ten years to serve K.L.M.

Foreign students may also be admitted for training to the"Rijksluchtvaartschool", in which case the Netherlands Government naturally cannot undertake to pay the cost of training.

Consequently besides the cost of board and lodging foreign students pilots or the foreign company as the case may be will have to pay the cost of the theoretical and practical training. In practice this cost amounts to approximately Dfl. 60·000,—

Training school Eelde of "Rijksluchtvaartschool"

This group of buildings of modern conception is built according to a design of the Amsterdam architect Pierre Cuypers; the interior is attended to by the artist Bart van der Leck.

For the sake of completeness it should be added that the building for the administrative departments also contains the classrooms for theoretical instruction and that the recreation building apart from a large recreation room, with refreshment bar contains a cloak-room, dining room, kitchen and reading rooms for study purposes.

The living quarters can accommodate 120 pupils in bedrooms for four. This building also contains showerbaths.

Aircraft and Linktrainers are kept in repair by the schools OWN personnel. For this purpose the Eelde training school contains workshops and stores.

SUMMARY

Navigation	220 hours.
Radio-navigation and communication	200 ,,
Meteorology	220 ,,
Aircraft-instruments	220 ,,
Aerodynamics, Performance, Stability and Structures	186 ,,
Aircraft engines, fuels and lubricants . . .	184 ,,
Air-laws	60 ,,
Flight navigator	130 ,,
TOTAL . .	1420 hours.

Not included repetitions, practical tests and excursions.

ATTACHMENT I

NAVIGATION

Time Table

(a) *Indication of geographical position.*

Geographical coordinates special points and lines on the earth's surface.

Shape and size of the earth.

Daily rotation and annual movement of the earth.

Connection between the movements of the earth and time indication.

Change of time with longitude; L.M.T., G.M.T., Zone T. and Standard T.

Determination of times of sunrise and sunset, moonrise and moonset and duration of twilight by means of the air almanac.

35 hours Units in use in air navigation.

(b) *Track angles, headings and transformation thereof.*

Variation, deviation, drift and drift correction. Rhumbline and great circle. Advantages and drawbacks in following these tracks. Mean variation track. Calculation of courses and distances by middle latitude and mercatorial formulae. Traverse tables. 30 hours.

(c) *Charts and maps.*

Properties of maps and their classification.

Principles of calculation or construction of the following Charts:

Conical, orthomorphic with two standard parallels

Mercator, middle latitude (universal plotting sheet).

Stereographic and Gnomonic. The use of and the precautions required in the use of these charts.

Standardisation of charts and chart symbols in accordance with ICAO.

45 hours Composition and use of route manuals.

(d) *Dead reckoning, navigation and position fixing.*

Position fixing except by means of astro. Influence of possible errors (most probable position).

Triangle of velocities, construction on the computors

Determination of the elements of triangle of velocitie during flight.

Flight planning and flight control during elementary flight.

Interception, radius of action and critical points.

Correction of altimeter and airspeed indications.

50 hours Principle of polar navigation.

40 hours (e) *Flight planning and plotting exercises.*

20 hours (f) Test papers.

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220 hours in total

ATTACHMENT 2

RADIO-NAVIGATION AND COMMUNICATION

Time-Table

(a) *Radio-technics.*

Oscillations, composed oscillations. Sound. Telephony.

Alternating current. Electric Oscillations in closed circuits. Electric oscillations in open circuits. Radiation. Wave front. Polarisation. Reception. Antennae. Directive pattern. Methods of transmitting and reception. Propagation of radiowaves. Radio-spectrum classification. Electronic-tubes. Rectifying Detection. Amplification. Oscillator. Cathode-ray tubes. Time-base. Special tubes. Principles of radar. Primary and secondary Radar Plan Position Indicator. Moving target indicator. Directional reception and transmission. Loop aerial. Principle of direction finding. 55

(b) *Radio-communication Aids.*

Transmitters and receivers for communication.

Communication for air traffic control and flight safety.

15 Ground and airborne equipment.

(c) *Radio-navigation Aids.*

1. *Radio-direction finders.* Ground and airborne direction finders. Direction-finding errors. Adcock-direction finders. Radio Compass. Direction finding from the ground.

2. *Non-directional radio beacons.* N.D.B. Locator. Z-marker. Fan-marker.

3. *Directional beacons.* IF/MF Radio Range. VAR. VOR

4. *Radar beacons.* DME.

5. *Radio location system.* Hyperbolic systems, Consol. Loran. Decca.

6. *Approach systems.* ILS, GCA.

7. *Radar systems.* SRE.

8. *Radar-altimeter.*

9. *Radio equipment of civil aircraft.*

65 10. *Radio facility chart symbols and documents.* Relating to these radio navigation aids.

(d) *En-route and approach procedures.*

15 Application of the radio navigational aids.

(e) *Communication-procedures.* Radio-telephonic communication, in relation to the application of radio navigational aids.

Codes and abbreviations, relating to the application of
15 the radio navigational aids.

(f) *Radio-navigation and Communication organisation in the Netherlands.*

Aeronautical Information Publication and Netherlands.
20 Notams in relation thereto.

15 (g) *Documents.* A.I.P. and Netherlands Notams, K.L.M.—publications, Annex 6 and 10 to the Chicago Convention on International Civil Aviation, in so far as not dealt with by the aforementioned subjects.

(h) *Excursions.*

1. *Air traffic control centre* at Schiphol.

2. *Radio-equipment of a civil aircraft,* combined with a visit to a *Radio instruction-classroom* of K.L.M. Royal Dutch Airlines at Schiphol.

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200 hours in total.

ATTACHMENT 3

METEOROLOGY

Time-Table	
3	*Introduction* (Aim and meaning of meteorology, broad survey of the principal weather elements and their physical relation; the gas equation).
2	*The atmosphere* (stratification and composition).
4	*Temperature* (lapse rate of temperature; atmospheric sounding curves; pseudo-adiabatic charts; inversion; measuring instruments).
8	*Humidity* (water-vapour pressure; saturation vapour pressure; relative humidity; specific humidity; mixing ratio; dew point; wet-bulb temperature; lifting condensation level; dry adiabatic and saturated adiabatic lapse rate; measuring instruments).
14	*Atmospheric pressure* (mercurial barometer; barometer corrections; QFE; Babinet-formula; QFF; standard atmosphere; barometric lapse rate; aneroid barometer; altimeter; altimeter-settings; QFE, QFF, QNH, QNE; correction of barometric altitude).
2	*Pressure systems.*
15	*Wind* (measuring instruments; pressure gradient; geostrophic wind; gradient wind; cyclostrophic wind; effect of friction; convergence and divergence; subsidence and lifting; isallobaric effects).
6	*Upper winds.* (upper air observations; construction, properties and use of isobaric surface; topographies as upper air-flow charts).
5	*Aerologation* (principles).
4	*States of vertical equilibrium in the atmosphere.*
3	*Working procedures on pseudo-adiabatic papers*
10	*Heat and heat transport in the atmosphere* (conduction; radiation; net radiation flow; surface temperature of the earth; isotherms; daily and annual temperature; variation; convection; turbulence).
3	*Air masses* (source regions; classification).
20	*Frontal-surfaces and fronts* (nomenclature, cyclonic wind discontinuity; the relative pressure-rise in rear of fronts; frontal surface slope; frontal weather phenomena; frontogenesis and frontolysis; classification; jet-streams).
7	*Conservative and non-conservative elements.*

16	*Clouds and hydrometeors* (condensation, sublimation; undercooling; condensation and sublimation nuclei; causes of cloud formation and cloud dispersal; cloud classification; hydrometeors; formation of precipitation showers and continuous precipitation).
4	*Ice accretion* (courses, classification; special cases; anti-icing and de-icing methods).
6	*Thunderstorms* (types; development; of the formation of strong electrical fields in cumulonimbi; internal structure of thunder-clouds; attending phenomena; dangers).
4	*Fog* (types; formation and dispersal of fog).
2	*Air-mass characteristics.*
10	*General circulation of the atmosphere* (mean distribution of pressure on the earth and in upper layers; meridional distribution of mean wind direction; monsoons and other periodical winds; local winds).
20	*Low pressure areas* (general properties; thermal and dynamic lows; frontal depressions; tropical cyclones tornados and spouts).
2	*High pressure areas* (properties; thermal and dynamic highs).
4	*Weather Charts* (analysis; displacement of pressure areas and fronts).
10	*Climatology.*
10	Meteorological briefing procedures (a.o. area and flight meteorological watch).
12	*Codes* (aero, synop, tafor, airep,Q-codes, plotting model).
14	*Practical training in weather chart analysis.*

220 hours in total

ATTACHMENT 4

AIRCRAFT-INSTRUMENTS

Time-Table	
20	*Electricity.*
	General requirements in relation to aircraft-instruments
	Engine speed indicators (tachometers).
10	Direct-reading engine-speed indicators (centrifugal engine-speed indicator. Pioneer's draf-cup type engine-speed indicator and the chronomatric engine-speed indicator). Remote-indicating tachometers (direct current engine-speed indicator; alternating current engine-speed indicator and General Electric's and Kollsman's rotary-current drag-up engine-speed indicator).

Syncronoscope

Thermometers.

Direct-reading thermometers (bimetalic type).

Resistance-thermometers (Wheatstone bridge circuit with moving-coil, Wheatstone bridge circuit with crossed coils and magneto, ratiometer circuit).

Thermo-electric thermometers (Lewis and Weston).

Measurement free air temperature (vortex thermometer)

8 Measurement temperature exhaust gas of jet engines;

Pressure gauges;

Relative pressure gauges (petrol and a oil pressure gauge vaccum gauge with single and dual connection)

Equalizing line.

Vacuum system.

Absolute pressure gauges (Pioneer's and Koilsman's manifold pressure gauges).

10 Warning systems for fuel and oil pressure.

Fuel-tank contents gauges.

Direct-reading gauges (dip-sticks, standpipe, mechanical types).

9 Remote-indicating fuel gauges (float-type; capacitive types; Pacitor, Pacitron, Honeywell and Avien.)

Fuel flow indicators.

5 Kent fuel flow meter, Pioneer fuel flow meter.

Electrical remote indicating systems.

8 D. C. Selsyn, Magnesyn and Autosyn.

Barometric altimeters.

Construction barometric altimeter.

Factors affecting the accuracy of indication.

10 Practical use and accuracy of indication under various flight conditions.

Rate of climb indicators.

4 Rate of climb indicator (Pioneer and Kollsman).

Air-speed indicators.

For lower and higher speeds.
Machmeter

True air speed indicator.

4 Accuracy of air-speed indications.

The measurement of total and static pressure.

Construction "Pilot-head", "Pilot-Static Head" and "Static Vent".

Accuracy of measurement during flight.

4	The effect of errors in static and total pressure on air-speed indicator, altimeter and rate-of-climb indicator.
6	*Magnetism.*
3	*Earth magnetic field.*
	Aircraft magnetic field and compass-deviations.
10	Development of compass-formula, determination coefficients compass-formula.
5	*Determination of deviation on the ground and in the air.*
10	*Compensation-methods.*
3	*Deviation in case of banks*
5	*Turning and acceleration-errors.*
5	*Construction aircraft magnetic compasses.*
	Gyroscopic Properties.
	Rigidity of a gyro and causes of gyro-wander.
7	Precession and angular velocity of precession.
	Artificial horizons.
	Acceleration errors artificial horizon correction of these errors.
	Construction artificial horizons (pneumatic and electric):
	1. with limited angular freedom of motion.
10	2. limitless artificial horizons.
	Directional gyroscopes.
	Gyro wander during loxodromic and great-circle flights.
	Turning-error directional gyro.
10	Construction and operation directional gyros (pneumatic and electrical types).
	Rate-of-turn indicator.
3	Construction and operation of the rate-of-turn indicator (pneumatic and electric).
2	*Gyrotron Vibratory gyro.*
	Gyromagnetic compasses.
	Gyrosyn compass.
	Gyrofluxgate compass.
15	Nl-compass-system.
	Automatic pilots.
25	A3, A12 and PB-10 automatic pilots.
5	*Zero-reader.*
3	*Drift-recorders.*

220 hours in total.

ATTACHMENT 5

AERODYNAMICS, PERFORMANCE, STABILITY AND STRUCTURES

Time-Table.

Aerodynamics.

The atmosphere. Specific gravity of air. Boyle's law, Gay-Lussac's law. Examples. The term "Kinetic energy and dynamic pressure". Density of the air. Standard-atmosphere. Compiling of the standard-atmosphere. Flowing air. Stream line. Stationary streaming. Parallel streaming. Stream-tubes. The law of Continuity. Statical pressure in a stream-tube. Bernouilli's theorem. Application Bernouilli's theorem. Air-speed indicators. Dynamic tubes. Static tubes. Correction factor density of the air, venturi-tubes, single and dual venturi-tubes. 10

Flow round and infinite cylinder.

Distribution of speed round a circle. Theoretical pressure distribution. d'Alembert's hydrodynamica paradox. Compressibility of the air. Sound velocity Mach number. Shock wave drag. Decrease efficiency of screws. Air-friction. Newton's law. Dynamic viscosity. Explanation of pressure drag from Prandtl's boundary-layer theory. Derivation of the formula for pressure drag. Reynold's number. The term mechanic similarity. Connection between flow and drag coefficient. 10

Laminar and turbulent boundary layer and the effects of it on the pressure drag and the frictional drag. Something on the determination of cw. The windtunnel. The scale-effect. The causes of lifting-force, Static and dynamic lifting-force. Impulsion theory. The circulation theory. Circulation round a rotating cylinder Magnus effects. The causes of lift on a wing with span. Starting-vortex. Lift and drag of a wing as function of the geometrical angle of attack. Stalling, critical angle of attack Decrease of circulation. Youkowsky's law. Practical and the theoretical development of the ca curve. The windtunnel-determination of ca, cw, e and Cm in the windtunnel. Polar diagram. Drawing of an aerofoil Aerofoil-indications. Skeleton-curve. Camber. 10

Lift and drag of a wing with a span. Ca average.

Induced drag. Vortex-distribution round wing. Downwash. Derivation of the cwi. Establishment change of angle of attack. Reduction formulae for cw. etc. Wash out to reduce cwi. Geometric and aerodynamic wash out. Axis and angles. Characteristics of wing-profiles ca max., cwp, ca/cw and Cm. The laminar flow profile. The polar curve of the laminar flow profile. Distribution of pressure round aerofoil. Determination of cm from the pressure-distribution. Establishment of the polar-curve, the parasite drag coefficient. Interference drag for high-winged and low-winged aircraft. 10

Performance.

Take-off. Forces on the aircraft during take-off.

Establishment of the take-off time and the take-off length. The minimum control speed of the aircraft. Factors effecting the minimum control speed. Taking off on concrete, grass, etc. 10

Straight level flight. Forces on the aircraft. The relation between polar-diagram and speed. Flying with the minimum drag. Establishment of the maximum speed ca3/cw2 curve. Examples. Determination cruising speed, working-life of the engine. Example. Effects of weight on Vmax and Vcruise.

1. flying with constant angle of attack.
2. flying with constant power.

Effects of altitude on Vmax and Vcruise. Falling of the engine-power with altitude. Examples, Speed-range of the aircraft. The economical speed of the aircraft. The economical ceiling. Determination of this altitude. Example. Gliding-flight. Forces on the aircraft. 10

The gliding-angle. The smallest gliding-angle. The forward speed with it. The speed of descent. Example. Climb. Forces on aircraft. The required power. The available power. The formula for the rate of climb. Examples. Times of climb. The falling of rate of climb with altitude. The times-altitude diagram, Determination of the theoretical and the practical ceiling. Examples. The stalling speed. Effects of altitude. Means to reduce Vmin. The effects of it on the gliding-angle. Landing. Ground-effects. Turning-flight. Forces on aircraft. Speed during flight. Determination of the angle of bank. Radius of the bank. Examples. Stalling-speed during turns. Load factors during turning-flight. 10

Slipping and skidding turns. The stalling in these cases. Spiral turns. Forces on the aircraft. The gliding-angle and speed of descent in case of spiral turns Diving. Determination speed-limits. The wing-moments. Change in speed-limit with increasing diving-height. Survey of the various flight-situations and the polarcurve. Ground-loop during take-off. During landing. Stalling-effects. Autorotation. Washout. Flying with one or more dead engines. Example. The propeller. The motion of the propeller. Pitch. Pitch angle. Angle of incidence, the function of the propeller. Balance between propeller and motor. 10

Derivation of the torque moment of the propeller Derivation-formulae of thrust and power. Determination efficiency. Wind-tunnel measurements and the propeller charts. Determination of the efficiency, the angle of incidence and propeller-diameter by means of the propeller-charts. Position of the propeller. Advantages of the pusher. Froude's theory. The performance chart. The N available-curve for a fixed propeller. Variable-pitch propeller and constant-speed propeller. Effect of these propellers on the engine revolutions at full speed. 10

Determination N requirement curve in 3 ways by means of calculation. By means of flight-tests. Determination of the climbing-speed curve. Points of the performance-chart. Effect of weight on the performance-chart. Effect of altitude on the performance-chart. Effects of head wind and tail wind on the performance-chart. The performance-chart for 1 engine-flight with flaps and landing-gear. Load factor of the aircraft. Various cases in which overloading occurs. Normal loading. Possible loading. Safety-factor. Design factor. Various flight-cases. High speed stalling. Overloading as a result of gusts. Speed at gusts. Load factors during aerobatics. Dive and looping. Load factor duringlanding. Spin and flat spin. 10

Stability.

Static stability and dynamic stability. Lateral stability. Directional stability. The longitudinal or pitching stability. Longitudinal-dihedral. Establishment of the angle of incidence of the wing and the tailplane. Control curves. Means to reduce the control forces. Aero-dynamic balance. Trim-tabs. Servo-tabs. Spring-tab. Construction. Static balance wing-flutter etc. Establishment centre of gravity of the aircraft by means of calculation and weighing. Loading-scheme. The use of a Road-sheet. Cruising-charts. Composition and arrangement. Density-altitude and pressure-altitude. 16

Structures.

10 Previous history. Balloons and airships. The aircraft, development etc. K.L.M. Royal Dutch Airlines, various history flights. Classification of aircraft.

10	Main parts of the aircraft. Service and function of the wing. Forces on the wing. Taking on these forces. Wooden wing-rib construction. Wooden spars-construction. Fillets in the wing-spars. Inward bracing of a wooden wing.
10	Survey of the constructions of a wooden wing. Wing-fittings. Bolt-connections. Castle-nut. Elastic stop-nut. Safety devices. Aileron-constructions. Differential ailerons. The Fokker-wing. Metal wing spares. Mono-spar construction. Junker-construction open-frame work. The Dakota-wing. Survey. Cross-section of Dakota-wing.
10	Wing arrangements. Riveting. Direct riveting, indirect riveting. Special rivets. Rivet-forms. Wooden fuselages. Bulk-head constructions. Stringers and re-inforced bulk-heads. Steel fuselages. Introduction. Carbon-steel and chrome-molybdenum steel. Fuselage covering and steel-tube constructions. Fuselage joints.
10	Engine attachments. Metal semi-monocoque fuselage. Geodetic body-construction. Tail-surfaces controls. Rudder-controls. Elevator and aileron controls. Dual controls.
10	The landing-gear. Fixed and retractable. Mechanically controlled landing-gear. Dakota. Nose-wheel L 49 Constellation. Tail-wheel DC 3 with locking arrangements. Compression-struts. Rubber. Faudi strut. Messier strut. Bendix strut. Koolhoven strut. Tyres. Wheels. Wheel-brakes. Bendix servobrake. Palmer air-brake.
10	Disc-brake. The hydraulic system generally. Hydraulic system Dakota. Hydraulic system (continued). Hydraulic panel. The fuel-system generally. The full-system of DC-3. The use of the fuel-system. Fuel-system C47 Dakota. Fuel-system DC 4. Tank-selector-valve DC 4. De-icing and anti-icing installations. Various systems etc.

186 hours in total

ATTACHMENT 6

AIRCRAFT ENGINES, FUELS AND LUBRICANTS

Time-table

Principles and some concepts.
Operation 4-stroke petrol engine.
Operation 4-stroke Diesel engine.
2-stroke engine, advantages and disadvantages.
Survey in-line and radial engines.
Technical units (Netherlands-English).
Bore, stroke, piston-displacement, compression ratio.
Direction of rotation. Engine speed.
Horse-power, horse-power hour.
Take-off power, metopower, cruising-power.
Specific engine weight.
Specific fuel-consumption. Heat-value.
Efficiency.
Transmission of power from piston on crankshaft.
20 Engine-torque.
Materials.
Ways of loading.
Tensile-strength safety-coefficient.
Steel and steel-alloys.
Aluminium and magnesium alloys.
Bearings.
6 Construction and checking.
Parts.
Crankshafts, balancing of crankshafts.
Connecting-rods, pistons.
Cylinders and cylinder-heads.
Valves and valve-gearing.
Valve diagram with explanation.
Crankcases, reduction-gearing mechanism.
24 Sleeve-valve engine, something on the supercharger.

Cooling.

Air-cooling.
6 Liquid cooling.
Advantages and drawbacks.
Indicator-diagram and efficiency.
Form and meaning of the indicator diagram.

Indicated mean effective pressure.
Calculation of the indicated power.
Mechanical losses, mechanical efficiency.
Effective power, brake mean effective pressure.
Thermal efficiency.
Heat-balance and Sankey-diagram.
10 Cylinder-charge.

Carburation.

Purpose of the carburettor.
Mixture-ratio chemically correct mixture.
Weak-and rich mixture and their application.
Composure exhaust gases.
Principle float-carburettor with.
Main jet, power jet, slow-running jet.
Acceleration-pump.
Shut-off cock, altitude control.
Up and down draught carburettors.
Construction and operation of injection-carburettor.
Direct fuel-injection.
14 Advantages and drawbacks of the various carburettors.

Practical instruction.

3 Assembling and disassembling of carburettors.

Carburettor-and combustion troubles.

Not-starting or starting-badly.
Backfiring, carburettor-fire.
Means to prevent it.
Overpriming, Hydraulicking.
Ice-forming in the intake system.
Prevention and removal of ice forming.
Vapour-lock.
12 Knocking, pre-ignition.

Mixture ratios and water-injection.

Effect of the mixture-ratio on flame-speed, cylinder-head temperature thermal efficiency, power.
Purpose of water-injection.
6 Water-injection system.

Fuel.

Distillation of crude-oil.
Kinds of petrol.
Properties of petrol i.a.
Knock-rating, volatility.

Vapour-pressure, formation of gum, fire-danger.
Means to increase the knock-rating.
8 Pumps and filters for petrol.

Lubricating-oil and lubrication-systems.
Purpose of the lubrication.
Properties of lubrication-oil i.a.
Viscosity, viscosity-index.
Carbon number, acid number, flame-point.
Oiliness (forming of sludge).
Kinds of lubricating-oil.
Lubrication systems.
Pumps, filters and oil-coolers.
Pressure and temperature of the lubricating-oil.

10 Means to obtain usable viscosity at every low outside temperatures.

Practical instruction:

1 Assembling and disassembling of various pumps and filters for oil and petrol.

Starting and ignition systems.
Hand-starting, cartridge-starters.
Electrical starters.
Magneto-ignition (high-tension system).
Compensated-magnetos.
Low-tension system, advantages and disadvantages.
Details concerning the spark plugs.
Booster coils and vibrators.

12 Firing-order.

Practical instruction.

2 Disassembling and assembling of various types of magnetos.

Air-screws.
Survey existing types.
Form and position of the propeller-blades.
Fixed-pitch air screw; variable-pitch air screw.
Constant-speed air screws.
Feathering air screw, reversing propeller.
Synchronizing.

12 Starting the engine in the air.

Superchargers.

Purpose of the superchargers.
Kinds of superchargers and the driving thereof.
Turbo-compressor.

6 Advantages and disadvantages.

Operating curves and torque meter.

Composition and use of operating curves.
Establishment of moment of supercharger-swift.
Corrections for deviating temperatures.
Exercises operating curves.
Construction and operation of the torque meter.
12 Torque meter-scale ; use of torque meter.

Engine-handling.

Survey of controls, switches and instruments for operating the modern aircraft engine.
6 Discussion of the engine operating instructions. (which are written in the English language).

Jet engines.

Jet propulsion.
Comparison rockets, Jet-engine, ramjet.
Construction and operation of the jet-engine.
Radial and axial compressors.
Fuel-system, kind of fuel.
Lubrication-system.
Starting of the jet-engine.
Engine-handling.
Thrust, power.
Fuel-consumption, efficiency.
Comparison jet-engine—piston-engine propeller.

Compound engines.

12 Propeller-turbine.

Practical instruction.

2 Assembling and disassembling of a jet-engine.

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184 hours in total.

ATTACHMENT 7

AIR LAWS

Time-table	
	Air traffic regulations.
	Air traffic regulations in accordance with Annex 2 to the Chicago Convention.
10	Aeronautical Telecommunications (Annex 10 to the Convention).
	Netherlands Air Traffic Regulations.
	Air Traffic Services (Annex 11).
10	Rules of the Air and Air Traffic Services Doc. 4444.
	Aeronautical Information Publication Netherlands.
	Notice to Airmen.
10	Aerodromes (Annex 14).
	Government Supervision of Air Navigation.
	Personnel licensing (Annex 1).
10	Statute-book 451, containing amendment Government Supervision of Air Navigation.
	Chicago Convention.
	Air Navigation Act.
	Act regulating the Investigation of Accidents to Civil Aircraft.
10	Customs regulations.
	Health and Sanitary regulations.
	Facilitation (Annex 9).
	Search and Rescue (Annex 12).
	Operation of aircraft (Annex 6).
10	Various Ministerial Orders.

60 hours in total.

ATTACHMENT 8

FLIGHT NAVIGATION

Time-table	
	Extension after passing B2-B1 examination.
	(*a*) *Spherical trigonometry.*
10	Formulae used in astro-navigation. Great circle track calculations.

(*b*) *Astronomy.*

Definitions. Systems of coordinates on the sphere P ×Z triangle. Apparent daily motion change in the coordinates of the fixed stars. Movement of the sun, moon and planets.

18 Orientation on the sphere (alignments, starfinders, sky diagrams, HO 249).

(*c*) *Instruments.*

Sextants (MK IX A and B, Pioneer and periscope).

8 Tolerance of sextant measurements. astro compass.

(*d*) *Astronomical navigation.*

Definitions. Altitude corrections, calculations of LHA (sun, moon, planets &). Altitude and azimuth, calculations by standard formulae.

Practical calculations using HO 218 & 249 tables.

Use of single position-line and astrofixes. Determination of latitude by polaris. Precomputed altitude and azimuth.

20 Influence of possible errors in position-lines. Future of of astro nagivation.

Practical tests min. 30 hours.

(*e*) *Flight preparations.*

Economy of the flight (cruising systems, cruising tables, preparation and control of long range flight plans).

20 Critical points (changing wind components).

(*f*) *Aerologation.*

Bellamy's formula, drift calculation, pressure lines of position, single heading.

Calculation of the height of standard pressure levels.

15 Minimum flight path and preparation of m.f.p. flight.

(*g*) *Polar navigation.*

Greenwich Grid system, means of following a special track.

5 Special application of astro.

(*h*) Use of the knowledge acquired for making hypothetical long range and polar flights (preparations, control by plotting using all kinds of fixing systems, howgozit and other systems).

Practical tests min. 70 hours.

(*i*) *High speed navigation.*

4 Special problems connected with preparation and control of these flights.

(*j*) *Extension of synoptic and dynamical meteorology and climatology.*

30	(a.o. virtual temperature; potential temperature, equivalent temperature; geopential and geodynamic meters; thermal wind; potential wet bulb temperature saturated potential temperature; mixing condensation level; annual variation of temperature, cloudiness fog, precipitation, thunderstorms, tropical storms and other phenomena on earth; cold and warm sea currents and their influence on climate; local winds in all parts of the world; weather forecasting rule jetstreams; etc.).

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130 hours in total.

SYLLABUS TIGER MOTH/FOKKER-S-11

I. *Familiarity with Cockpit lay-out.*

II. *Preparation for Flight.*

1. (a) Before getting into the Aircraft.
   (b) Before starting the Engine.
2. Starting and warming up the Engine.
3. Complete cockpitcheck while warming up the Engine.
4. Running up the Engine.
5. What to do in the event of Fire.

III. *Effect of Controls.*

1. The effect of the separate controls.
2. The effect of slipstream and speed on the controls.
3. Secondary effect of the ailerons.
4. Secondary effect of the rudder.

IV. *Taxying.*

V. *Straight and Level Flight.*

1. Longitudinal stability.
2. Lateral and directional Stability.
3. Straight and level Flight at different air speeds.

VI. *Climbing.*

VII. *Descending.*

VIII. *Stalling.*

1. With engine off.
2. With engine on.

IX. *Normal turns.*

1. The accurate turn.
2. Faults likely to be made *e.g.* slipping turns.

X. *Descending and climbing Turns.*

1. Normal gliding turns with engine off.
2. Descending turns with engine on.
3. Climbing turns.

XI. *Taking-off.*

1. Taking-off into wind.
2. Taking-off with sidewind.

XII. *The Approach and Landing.*

1. Glide Approach and Landing.
2. Engine-assisted approach and landing.
3. Touch and go landings.
4. Wheel landing.

XIII. *Sideslipping.*

1. Effect of the controls in a sideslip.
2. Sideslipping in the direction of the wind and in sidewind.
3. Changing over from a sideslip in one direction to one in the opposite direction.

XIV. *Steepturns.*

1. Steepturns with power on.
2. Stalling in a steepturn.
3. Steepturns with power off.
4. Turns of 45° near the ground.

XV. *Stalling turns.*

1. With power on.
2. With power off.

XVI. *Lowspeed turns with constant power setting.*

XVII. *Crosswind Landings.*

XVIII. *Precautionary Landing with engine on.*

XIX. *Practice Forced Landings with engine off.*

XX. *Spins.*

1. Start of a spin with power on.
2. Start of a spin with power off.
3. Start from level flight.
4. Start from turns.

} and resuming level flight.

XXI. *First solo.*

XXII. *Navigation* (dual control).

1. Knowledge of aeronautical charts.
2. Map reading.

3. Operation of compass.
4. Course steering.
5. Proceedings on arrival at and departure from foreign airfields.

XXIII. *Navigation* (solo):

1. A cross-country flight of at least two hours without a full-stop landing.
2. Cross-country flight including a full-stop landing at different points along the route.

XXIV. *Instrument flying* :

1. Thorough pre-flight planning.
2. Instruction during flight on the primary instruments.

INSTRUMENT FLYING ON THE FOKKER S-11 (5 hours)

I. *Extensive preliminary discussion on* :

1. Flying with external visual aids.
2. The reliability of the instruments.
3. The fallibility of physical sensations.
4. Changing the trim of the aircraft and maintaining the attitude of the image on the Artificial Horizon by using the controls.

Instruction in the Air :

1. Demonstrations of maintaining the lateral and longitudinal stability with open and closed hood.
2. Indications of the Altimeter, Airspeed Indicator, Vertical Speed Indicator and other indicators showing the attitude of the aircraft.
3. Repetition of all exercises and discussion after flight.

II. *Preliminary discussion on*:

1. The lay out of the instrument panel and the use of the instruments.
2. Inertia of the aircraft.
3. The importance of power setting.

Instruction in the Air :

1. Demonstrations of the inertia effect by flying on constant height with alternately full throttle and closed throttle.
2. Changing speed on constant height to demonstrate power settings.
3. The value of the indications of the Altimeter.
4. Repetition and recapitulation of I and II.

III. *Preliminary discussion on* :

1. Keeping height by power setting.
2. The relationship between height, speed and power setting.

Instruction in the Air:

1. Demonstrations and exercises in gaining or losing height with constant speed.
2. Repetition and combinations of the exercises under I, II and III.

IV. *Preliminary discussion on*

1. Climbing and descending with different justifiable combinations of airspeeds.
2. The correct procedure.
3. Attention to be paid during the climb and the descent to the engine instruments.

Instruction in the Air :

1. Demonstrations and exercises in climbing and descending.
2. The value of the indications of the Air speed Indicator.
3. Repetition and combinations of the exercises under I, II, III and IV.

V. *Preliminary discussion on turns*:

1. The standard turn.
2. The relationship between angle of bank, turning speed and air speed.
3. The correct reading of the image.
4. The difficulty of keeping a constant bank.
5. The turn and bank indicator.

Instruction in the Air :

1. Demonstrations and exercises of rate 1 and rate 2.
2. Changing over from left hand turns to right hand turns and *vice versa.*
3. Turns at different air speeds.
4. Repetition of all previous exercises.

SYLLABUS HARVARD

I. *Ground Training Course* :

Before starting flying on the Harvard, students are given a ground course and examination on the aircraft. This course is covered in a period of three days. The course will consist of lectures by the Technical Department on the Harvard aircraft and also some time will be spent on showing students around the aircraft and pointing out things covered on the lectures.

Subjects to be covered by the T.D. are the following:—

1. Air-craft in general (weight, size, type etc.)
2. Hydraulic system.
3. Fuel system.
4. Oil system.
5. Electrical system.

6. Vacuum system.
7. Heating system.
8. Instruments.
9. Propellors.
10. Carburettor.

The examinations on these subjects will be set and marked by the T.D. The flying dept. will outline the course to be covered from the syllabus.

The lectures to be covered before the students start flying are the following:

1. Cockpit drill—Explanations should be given of everything on the check list such as starting, running up etc.
2. Airmanship—to include the aerodrome layout, flying control set-up and signal area.
3. Operating limitations, operating procedure and performance data.
4. Flying orders and other orders pertaining to the flight.
5. Action in event of fire.
6. Radio operation and installation (this should be given by a wireless operator).
7. Abandoning the aircraft.

Other subjects to be covered when the weather does not permit flying are:

1. Circuit flying—In this lecture take-off and landing will be covered.
2. Taxying, climbing and descending, stalling, turns (rate 1, medium, steep), spinning, low flying, precautionary landings, forced landings, X-wind take-offs and landings, acrobatics, night flying and formation flying.
3. Navigation as applied to the Harvard cross-countries.
4. Compass swinging with actual practice.
5. Engine handling.
6. Icing.
7. Instrument flying.
8. R/T Procedure.
9. A.T.C. control and schiphol approach control (wireless operators).

During the course much time can be spent in making the students familiar with the aircraft by showing the various systems and parts of the aircraft to the students, and in working on the aircraft.

The instructor makes up a list of questions on the subjects covered and on the theory and mechanics of flight.

These questions could be used in quizzes. Also the question will give a good indication as to which subjects should be covered more thoroughly

II. *Familiarity with Cockpit Layout*:

The Cockpit drills and procedures are laid out to comply with the dril used on the Beechcraft. Drills should be learned thoroughly and the instructors must insist that the students do them perfectly.

Some pilots can execute exercises better than others through natural ability, but cockpit drills are only a matter of work and concentration and they can be done perfectly by anyone of average mental ability.

III. *Preparation for Flight* :

1. Before getting into the aircraft.
2. Before starting the Engine.
3. Starting and Warming up.
4. Running-up.
5. Action after Flight—Running down.

IV. *Air Experience*:

V. *Effect of Controls*:

1. The Main Controls.
2. The Trimmers.
3. The Under carriage.
4. The Flaps.
5. Engine Controls

VI. *Taxying*:

VII. *Straight and Level Flight—Cruising*:

1. Straight and Level Flight.
2. Cruising for Maximum Range.
3. Cruising for Maximum Endurance.
4. Cruising at low speed.
5. Cruising at high Speed.

VIII. *Climbing* :

1. Climb at Recommended Power and Airspeed.
2. Climb at Maximum Rate.
3. Climbing with Flaps and Undercarriage Down.

IX. *Descending* :

1. Engine-assisted Descent (Undercarriage and Flaps up).
2. Engine-assisted Descent (Undercarriage and Flaps down).
3. Gliding.
4. Diving.

X. *Stalling* :

1. Undercarriage and Flaps up-Engine off.
2. Undercarriage and Flaps down-Engine off
3. Undercarriage and Flaps down-Engine on.
4. Stall off a shallow Dive.
5. Stall off a steel Turn.

XI. *Medium Turns*:

XII. *Descending and Climbing Turns*:

XIII. *Taking-off into Wind*:

1. Taking-off into Wind.
2. Total engine failure after take-off.

XIV. *Approach and Landing.*

1. Preliminaries to all landing.
2. Engine-assisted Approach and Landing.
3. Glide Approach and Landing.
4. Approach and Landing without Flaps.
5. Wheel Landing.
6. Short Landing.
7. Going Round again.

XV. *First Solo* :

XVI. *Steep Turns*:

1. The Normal Steep Turn.
2. Stalling in a Steep Turn.
3. The Maximun Turn.
4. Miscellaneous Steep Turns.

XVII. *Low Flying* :

1. Low Flying due to Low Cloud Base.
2. Low flying due to Bad Visibility.

XVIII. *Taking-off and Landing out of the wind.*

1. Taking-off out of Wind.
2. Landing out of Wind.

XIX. *Precautionary Landings*:

XX. *Forced Landings* :

1. Practice Forced Landing.
2. Actual Forced Landing.

XXI. *Action in the Event of Fire*:

XXII. *Aerobatics* :

1. Loop.
2. Slow Roll.
3. Barrel Roll.

4. Roll off the Top of a Loop.
5. Aileron Turn.
6. Half Roll.
7. Stall Turn.

XXIII. *Instrument Flying*:

All students are going on to airline flying so precision flying should be stressed throughout the course and a considerable amount of time spent on instrument flying (20 hours). Attitude flying is to be stressed.

1. Use of instruments and explanation of each.
2. Throttle and elevator control at constant height Stress nose position and power.
3. Turns at constant height and speed. Stress angle of bank, nose position and power. Bank variation with airspeed. (110 m.p.h.-15° bank—150 m.p.h.-20° bank).
4. Timed turns to various headings.
   Climbing and descending. Stress relationship of the amount of power put on or taken off for rate of climb or descent.
5. Turning and descending simultaneously to various headings and assigned, altitudes at set rates of descent.
6. All exercises repeated on limited panel.
7. Pattern flying. This is to cover all previous exercises and given practise in planning work ahead. (Patterns attached).
8. Unusual positions and incipient spins. This exercise to be covered thoroughly until proficient in all phases.
9. Instrument take-offs. To be taught and practised throughout.
10. V.H.F. Homings.

SYLLABUS SAAB SAFIR

The instruction, which will be given on the SAAB Safir has primarily the object in giving the student confidence to cope with the most important problems which can arise during:

(*a*) Navigation.

(*b*) Use of Radio Compass and all its possibilities as the easy to Fly SAAB Safir requires little attention, the student can concentrate more on navigation and Radio Compass work. During the begin period of the course special attention is continually concentrated, as a continuation from the Harvard on precision flying under VFR as also under IFR conditions. The whole course is divided into the following exercises:

I. *Familiarity with the aircraft* :

Knowledge of the complete technical details and cockpit layout of the SAAB Safir.

II. *Flight preparation*:

1. Administration.
2. Checklist.

III. *Familarization*:

Advantages and disadvantages of the side by side seats.

IV. *Effect of control*:

1. Main controls.
2. Trimmers.
3. Undercarriage.
4. Flaps.
5. Engine controls.

V. *Taxing*:

1. Brake test.
2. Instruments test.
3. Effect of the Wind.
4. Effect of the nose wheel.
5. Parking.

VI. *Straight level flight*:

1. The pure idea of attitude and deviations which can arise when reacting on a false sense.
2. Inertia.
3. Power settings.
4. Balanced Flight.
5. Endurance range, normal and law safe cruising.
6. Effect of flaps on the attitude and power settings.
7. 1—6 on instruments.

VII. *Climbing and descending*:

1. Considerations of power settings for climbing or descending with special reference to the airspeed indicator.
2. Maxmium and normal climb.
3. Climbing with under carriage and flaps lowered.
4. Gliding
5. Climbing and descending with various indicated airspeeds and certain rate of climb and descent.
6. Levelling out the horizontal flight from a climb or descent.
7. Items 1—6 on instruments.

VIII. *Stalling*:

1. Undercarriage and flaps up without power.
2. Undercarriage and flaps down without power.
3. Undercarriage and flaps down with power.
4. Stalling in a steep turn.
5. Items 1—4 on instruments.

IX. *Turns (Horizontal climbing and descending)*:

1. The "rate one" turn with various speeds.
2. Large alterations of course.
3. Small alterations of course.
4. Steep turns.
5. Items 1—4 on instruments.

X. *Take off*:

1. The normal take off.
2. The overshoot action.
3. Precautionary take off.
4. Take off with cross wind.
5. Instrument take off.

XI. *The Landing*:

1. Engine assisted approach and landing.
2. Glide approach and landing.
3. Precautionary approach and landing.
4. Crosswind approach and landing.
5. Flapless approach and landing.

XII. *The Circuit*:

1. Entering the circuit.
2. Normal left hand circuit.
3. Direct approach.
4. Bad weather circuit.
5. Right hand circuit.
6. Runway procedures.

XIII. *Navigation*:

1. The value of DR position.
2. Pilot navigation: the one in 60 method and the 10 degree lines.
3. Radio compass navigation (airways).
4. Plotting of radio bearings on a Mercator plotting sheet.
5. Log Keeping.

XIV. *Forced Landings* :

1. Direct after take off.
2. Above 1000 feet.

XV. *Action in event of fire*:

XVI. *Radio Compass*:

1. Manipulation of the radio compass.
2. Intercepting courses.
3. Making good a track to a station.

4. Making good a track *from* a station.
5. Time to a station.
6. Item 1-2 with the "loop"

XVII. *Holding procedures*:

1. The normal holding.
2. The figure of eight.
3. The procedure turn.
4. 360° turn.
5. Item 1—4 with the "loop".

XVIII. *Approaches*:

1. A.D.F. letdowns with one or more beacons.
2. Back beam approach.
3. Missed approach.
4. Item 1—3 with the "loop".
5. GCA.
6. V.D.F. homing.

XIX. *Night flying*:

Take off and landings.

SYLLABUS BEECHCRAFT D18S

The Beechcraft training is considered mainly as a preliminary training to airline work. A short period is being spent on conversion to twin engined aircraft stressing single engine flying. A greater part of the training is spent on precision instrument flying radio procedures and navigation as applied to airline flying.

GENERAL FLYING

I. *Aircraft familiarization*:

A. *Externally*.

1. Main controls.
2. Trimming tabs.
3. Radio aerials.
4. Air intakes.
5. Undercarriage assembly.
6. Cowlings.

B. *Internally*.

1. Safety straps.
2. Windows.
3. Adjusting seats.
4. Clear vision panel.
5. Pitot heater.
6. Lights.

7 Windscreen wipers.
8. Oil delution.

C. *Aircraft systems.*

1. Fuel and oil systems, indicators and warning lights.
2. Braking system.
3. Parking brake.
4. The electrical system.
5. Undercarriage system.
6. Flaps.
7. Generator.
8. Warning lights and indicators.
9. Intercommunication and auxiliary switches.
10. Circuit breakers and fuses.
11. Radio.

D. *Cockpit Layout*:

1. Cockpit check.
2. Engine power and other instruments.
3. Flight instruments.

E. *Controls*:

1. Throttle and RPM controls.
2. Mixture and carb. heat controls and engine cut-out.
3. Engine switches, priming and starting controls.

Flying controls and trimming devices.
Other controls and switches as appliable.

II. *Preparations for Flight*:

A. *Before flight*:

1. Aircraft acceptance (BVL).
2. Flight authorization.
3. Flight plan.
4. Meteo (route and terminal forecast).
5. Navigation equipment and headphones.
6. Lifebelts abroad, when part of the flight is over sea.
7. Flashlights.
8. External checks.
9. Internal checks.
10. Starting and warming up.
11. Run-up and take-off checks.

B. *After flight*:

1. Running down.
2. Leaving the aircraft.

C. *Drills and checks*:
   1. On the ground.
   2. During flight.
   4. Emergency drills and checks.

III. *Air Experience*:

IV. *Effect of controls*:
   1. The function of primary controls.
   2. Correct seating and control techique.
   3. Effect of bank.
   4. Effect of yaw.
   5. Effect of aileron drag.
   6. Effect of airspeed.
   7. Effect of power.
   8. Trimming of controls.
   9. Effect of flaps and undercarriage.
   10. Effect of engine controls.

V. *Taxying*:
   1. Control of direction (basic principles).
   2. Safety.
   3. Use of power.
   4. Use of controls.
   5. Effect of wind.
   6. Use of brakes.
   7. Engine handling.
   8. Instruments and brake checks.

VI. *Straight and level flight*:
   1. Attitude in all three planes.
   2. Power.
   3. Balance.
   4. Trim.
   5. Instruments.
   6. Lookout.

VII. *Climbing and descending*:
   1. Method of attaining climb.
   2. Climbing at recommended power and airspeed.
   3. Climbing at maximum rate (emergency climb).
   4. Effect of flap on climbing performance.
   5. Climbing with flap and undercarriage down.
   6. Descending without power, gliding and without flaps.
   7. Engine assisted descent.
   8. Effect of flaps and undercarriage.

9. Engine handling.
10. Instruments.

VIII. *Stalling*:

A. *Pre-flight.*

1. Lift, the stalling angle and stalling speed.
2. Characteristics of the stall.
3. Factors effecting the stalling speed.
4. Attitude and the stall.
5. Recovery from the stall, use of power.
6. Look-out and airmanship.

B. *Air instruction.*

1. Symptoms of the stall.
2. Recovery from the stall without power.
3. Correct recovery.
4. Stall with power.
5. Effects of flaps and undercarriage.
6. Recovery when a wing has dropped.

IX. *Turning*:

1. Medium turns in level flights.
2. Climbing turns.
3. Gliding turns, with and without flaps.
4. Engine assisted descending turns with and without flaps and undercarriage down.
5. Side-slipping turns.
6. Instruments.
7. Look-out.

X. *Flight on asymetric power*:

1. The basic factors.
2. Demonstration flying on asymetric power.
3. Effects of engine failure and use of rudders.
4. Demonstration of′critical speed.
5. Demonstration of the effects of bank.
6. Deliberate turning on asymetric power.

XI. *Action in the event of fire*:

1. During flight.
2. While engine starting.

XII. *Take off and climb to down wind position*:

1. Checks and actions before take off.
2. Take off using elevators and throttle.

3. Take off using all controls.
4. Procedures and checks when flying-speed has been attained.
5. Action in the event of engine failure.
6. Short field take-off (eventually followed by emergency climb).
7. Crosswind take-off.

XIII. *Approach and landing.*

1. Glide approach and landing.
2. Engine assisted approach and landing.
3. Three point landing.
4. Wheel landing.
5. Landing on asymetric power (n-1 engines).
6. Correction of a mislanding.
7. Going round again.
8. Going round again on n-1 engines.

XIV. *First solo.*

XV. *Action in the event of fire.*

These exercises will be repeated throughout the whole instrument course.

NAVIGATION

I. *Pre-Flight.*

1. Route information, alternate and minimum safety heights.
2. Radio aids.
3. Stowing plan.
4. Weather (on route, terminal and alternate).
5. Flight plan.
6. Time-way diagram.
7. Cruising charts.
8. Clearance.

II. *During Flight.*

1. Climbing as cleared.
2. R/T procedures to be used (I.C.A.O.)
3. Time-way chart and log.
4. Radio aids to be used for navigation (radio compass, loop, MF/DF VDF, Radio Range, Consol and Omni Range).

III. *After Flight.*

Time-way chart and flight log will be checked by the Navigator.

Cross sections will be debriefed by the METEO officials.

NOTE.—Navigation flights will be made in the Flight Information Regions of The Netherlands, Germany, Belgium, Denmark, United Kingdom and over the North Sea. Furthermore navigation flights, *via* Airways, followed by a ADF, ILS or GCA landing, will be made to: Bremen, Hamburg, Dusselderf, Frankfort, Zurich, Geneva, Brussels, London Airport, Paris, Croydon Southend, Manchester and Copenhagen.

In future flights will be made *via* Airways to Stockholm, Dublin, Nice, Madrid, Lisbon and Rome.

NIGHT FLYING

I. *Pre-Flight.*

1. Airfield layout and lighting.
2. Obstacles.
3. Cockpit layout (switches, landing lights, cockpit lighting).
4. Adaption of vision to night-flying.
5. Flash lights.
6. Light signals from flying control.
7. Navigation lights.
8. Taxying speed.

II. *During Flight.*

1. Location of light switches.
2. Amount of cockpit lighting.
3. Taxying speed.
4. Checks.
5. Use of Runway lights.
6. Use of instruments during the circuit.
7. The circuit.
8. Radio aids.
9. Approach.
10. Landing.

INSTRUMENT FLYING

I. *First experience of attitude interpretation without natural horizon.*

II. *Straight and level flight.*

1. Instrument indication and interpretation.
2. Attitude alterations.
3. Effect of power changes.
4. Effect of undercarriage and flaps.
5. Trim.

Sequences 1-5 will be repeated on limited panel.

III. *Climbing and descending.*

1. Instrument interpretation of climbing attitude.
2. Varying rates of climb at constant airspeed.

3. Constant rate of climb at varying airspeeds.
4. Levelling off
5. Instrument interpretation of descending attitude.
6. Varying rates of descent at constant airspeeds.
7. Gliding.
8. Maintaining a constant rate of descent at varying airspeeds.

Sequences 1-8 will be repeated on limited panel.

IV. Stalling.

1. Stall with undercarriage and flaps up (power off).
2. Stall with undercarriage and flaps down (power off).
3. Stall with undercarriage and flaps up (power on).
4. Stall with undercarriage and flaps down (power on).

V. Turning.

1. Medium turns in level flight.
2. Climbing turns.
3. Gliding turns, with and without flaps.
4. Engine assisted descending turns with and without flaps and undercarriage down.
5. Side slipping turns.
6. Steep turns.
7. Instruments.

Sequences 1-7 will be repeated on limited panel.

VI. Flight on asymetric power.

1. Reaction.
2. Keeping control of the aircraft.
3. Drills and checks.

VII. Action in the event of fire.

VIII. Instrument take off.

1. Checking instruments while taxying.
2. Importance of direction indicator.
3. Importance of artificial horizon.
4. Cross reference.
5. Unreliability of altimeter, during take-off.
6. Undercarriage up during climb.
7. First reduction.
8. This exercise will be repeated throughout the whole instrument course.

IX. Pattern flying.

X. Radio compass.

1. Tuning.

2. Homing.
3. Drift correction and tracking to a station.
4. Drift correction and tracking away from a station.
5. Distance calculation.
6. Intercepting and tracking on predetermined bearings

XI. Loop.

1. Tuning.
2. Solving the 180 ambiguity
3. Tracking.
4. Passing the station.
5. Intercepting.
6. Distance calculation.

XII. Holdings.

1. Standard holdings.
2. Holding with an expected approach time.
3. Figure of eight.
4. Steep turn.
5. Procedure turn.
6. Runway procedures.

XIII. Approaches.

1. ADF approach (one or two beacons).
2. ADF back beam approach.
3. Missed approach (overshoot).

XIV.

1. Figure of eight on ILS.
2. ILS approach.
3. ILS back beam approach.
4. ILS single engine approach.
5. Missed approach (overshoot).

XV. GCA Approach.

XVI. Omni Range.

XVII. Radio Range.

XVIII. Emergency procedures on instruments

1. Engine failure during take-off.
2. Engine failure during climb (below 500 ft.)
3. Engine failure during climb (above 500 ft).
4. Engine failure during the approach.
5. Single engined overshoot

LINK—INSTRUCTION PROGRAMME

Grading 10 hours (20 periods of 30 minutes each)

Stage I (20 hours Exercises in instrument flying to acquire an accurate knowledge and proficiency regarding:

1. the importance of attitude flying and power setting.
2. climbing and descending at all possible safe airspeeds and rates of descent/ascent.
3. the importance of keeping constant altitude.
4. making turns.
5. determining and maintaining a course with the aid of the Magnetic Compass and the Gyro Direction Indicator.
6. recovery from spins.

During the above exercises "full" and "limited" panel systems are used. (12—16 hours). The remaining hours are spent with trackflying according to time schedules. Besides maintaining flight attitude, the student is gradually introduced into working out navigational problems and maintaining radio-telephony communication with ground-stations. At the end of stage I, the student must be entirely familiar with Q.D.M.'s obtained by radio-telephony and with these Q.D.M.'s he must be able to make a safe letdown procedure.

Stage II (60 hours) In this stage the visual Q.D.M. is introduced by means of the Radio Compass.

The student is taught homing, to keep within a predetermined safety lane, to intercept courses, to determine wind effects, to measure distances, to carry out holdings and letdown procedures and to use the handloop if the automatic function of the A.D.F. becomes u.s. (20 hours). Next he will be trained in the use of I.L.S. whereby he must be able to make front and back-beam landings (10 hours).

To acquaint the student with beamsignals, a few hours' instruction in the Standard Beam Approach System is given as an introduction in the use of the Radio Range, which is taught next.

Although Radio Range procedures can be considerably shortened by using a Radio Compass, the students are also trained in R.R. procedures without an A.D.F. so as to cope with the situation in case the A.D.F. becomes u.s. The training aims at treating the subject matter in such a way, that after 10 hours' instruction this part of the programme has been dealt with. Next the student is trained in using square, crawfoot, scissor, R.R. stations, beam-bracketing and flying Range legs and in reaching the leg that covers the runway in a safe and economic way. After this syllabus the student has reached a fair standard in elementary instrument-flying. The last 10 hours of stage II are spent with repetitions of these exercises and increasing the student's proficiency.

Stage III

(90 hours)

Exercises in solving complicated problems with landing-charts of the most important airfields in Europe and elsewhere.

Increasing the proficiency of the student in the subject-matter treated before.

APPENDIX 9

NOTE DETAILING INFORMATION REGARDING TRAINING FACILITIES AVAILABLE WITH THE TWO CORPORATIONS AND NON-SCHEDULED OPERATORS

Air India International

Air India International recruit pilots having the following qualifications and experience :—

1. *Qualifications :* Pilots 'B' licence.

2. *Experience :* (*i*) 4,000 hours of total flying experience.

(*ii*) 1,500 hours of command experience on twin or multi-engined aircraft.

(*iii*) 250 hours of night flying experience of which 100 hours should be in command.

(*iv*) 200 hours of Instrument flying of which 50% may be under simulated conditions.

3. On joining the Corporation they are given training as per details shown below before releasing them to fly as co-pilots on our services :—

3.1. Technical lectures to cover the type of aircraft, engines, instruments and all accessories for a period of 3 to 4 weeks, at the end of which they appear for a technical examination held by the D.G.C.A.

3.2. Navigation lectures to cover practical navigation, route information, A.T.C. procedures and Meteorology for a period of 2 weeks.

3.3. Lectures in the use of R/T and Communication procedure for 2 days.

3.4. Link course to cover basic Instrument flying, Airways procedure and holding and Let-down procedure using various aids for a total of approximately 30 hours.

3.5. Study of Corporations Rules, Circulars and Operating procedures.

3.6. Supernumerary flying on our routes for a minimum of 100 hours.

3.7. Local flight training of approximately 8 hours covering the following :—

1. Pre-flight familiarisation.

1.1. Cockpit check drill.

1.2. Operation of landing gear controls.

1.3. Operation of flap controls.

1.4. Operation of boost disconnects.
1.5. Operations of auto-pilot controls.

2. General handling.
2.1. Taxying.
2.2. Use of nose wheel steering.
2.3. Use of reverse thrust controls.

3. Level turns at high speed.
3.1. Level turns with low speed.
3.2. Level turns with 60% flap.
3.3. Descending turns.
3.4. Climbing turns.

4. Asymmetric flight.
4.1. Outer engine feathering.
4.2. Rate 1 and Rate 2 turns with 3 engines.
4.3. 2 Engine feathering on the same side.
4.4. Turns on both sides.

5. Boost-out operations.
5.1. Disconnecting booster controls.
5.2. Boost-out turns.
5.3. Engaging booster controls.

6. Emergency Gear Extension.
6.1. Emergency Brake Operation.
6.2. Emergency Flap Operations.

7. Instrument flying.
7.1. Straight climb.
7.2. Climbing turns.
7.3. Level turns.
7.4. Turns with one engine out.
7.5. Descending turns.
7.6. Let down.

8. Take-off.
8.1. Circuit, Approach and landing.
8.2. Overshoot.
8.3. Landing with one engine out.
8.4. Cross-wind take-off and landing.

9. Emergency procedures.—actual or oral
9.1. Engine fire.
9.2. Cabin fire.

9.3. Cargo Compartment fire.
9.4. Smoke removal.
9.5. Use of emergency brake and hand pump.
9.6. Fuel dumping.
9.7. Ditching drill.

4. On completion of the above training, an endorsement test is carried out by the D.G.C.A. approved check pilot and then a ratification check is carried out by the Government approved Examiner.

5. On obtaining type endorsement on his 'B' licence from D.G.C.A., he is scheduled out under supervision for a couple of flights on our routes and upon receipt of favourable check reports, he is released to fly as a regular co-pilot.

6. Instrument flying practice on Link is given every month.

7. For the renewal of 'B' licence, a 6 monthly Instrument flight check is given to all co-pilots covering the following :—

1. Engine failure on take-off.
2. General Instrument Flying.
3. Let-down procedure.
4. Landing with one engine out.

8. The co-pilots also undergo a route check every 6 months as per D.G.C.A.'s requirements for the renewal of their 'B' Licences.

9. In addition to the above, a flight refresher course covering all items of their initial training is carried out approximately once a year. Courses for 2nd Class Navigator's Licence are conducted by an Instructor holding 1st Class Navigator's licence. All Pilots undergoing Command Training are holders of 2nd Class Navigator's licence.

Command Training :

10. After obtaining 1500 Hrs/2000 Hrs of flying experience as First Officer, a pilot is taken up for his command training during which he is given :—

10.1. Link Course.

10.2. Technical refresher course on aircraft and engines.

10.3. Local flight training of approximately 15/20 hrs. covering the following :—

1. Normal take-off and landing.
1.1 Landing with 60% flap.
1.2. Take-off with zero flap, landing with zero flap.
1.3. Touch and Go with 60% flap.
1.4. Approach with 100% flap and overshoot.
1.5. Cross wind take-off and landing.
1.6. Circuit at low altitude and landing.
1.7. Landing from right hand seat.

2. Engine failure on take-off before V1.
2.1. Engine failure on take-off after V1 and V2.
2.2. Engine failure on take-off after V2.
2.3. 3 Engine landing with 60% flap.
2.4. 3 Engine landing with 100% flap.
2.5. 3 Engine approach with 100% flap and overshoot.
2.6. 2 Engine landing.
3. Boost out overshoot.
3.1. Auxiliary boost landing.
3.2. Boost out landing.

4. Emergency procedures.
4.1. Engine fire.
4.2. Cabin fire.
4.3. Cargo Compartment fire.
4.4. Smoke removal.
4.5. Emergency gear extension.
4.6. Emergency flap extension.
4.7. Emergency brake operation.
4.8. Fuel dumping.
4.9. Ditching drill.

5. Instrument flying.
5.1. Engine failure on take-off after V2.
5.2. Climb.
5.3. Climb in turns.
5.4. Level turns.
5.5. Steep turns.
5.6. Flight with limited panel.
5.7. Orientation.
5.8. Let-down.

11. Instrument Link and Flight Training is given to bring him upto the Instrument rating standard and then a test is given as per D.G.C.A.'s Instrument Rating Test form by the Government Approved Examiner.

12. The pilots taken up for command training then undergo supervision flights with D.G.C.A. approved check pilots for 300/500 hours. Upon obtaining satisfactory check reports, a P.I.C. test is being carried out by D.G.C.A.'s check pilot and then a ratification check by Government Approved Examiner. On obtaining P.I.C. endorsement on his 'B' Licence and Instrument Rating Certificate, he is released to fly as Commander on a certain route.

13. After a couple of hundred hours experience as Commander, he is given a route check on the route other than the one operated by him to qualify him for that particular route and also to ascertain whether the pilot has been maintaining the standard required. This way he is given check on all the routes he is required to operate.

14. **All commanders are given Instrument flying practice on Link every month.**

15. Every 6 months **actual instrument flight check is carried out** for the renewal of 'B' licence.

16. Route check is given to all commanders for renewal of 'B' licence every 6 months as per D.G.C.A.'s requirements.

17. In addition to the above a flight refresher course is given approximately once a year to cover all the items laid down in the command training.

18. The above training has been found enough and suitable to maintain our pilot's standard equal to any International Operator for the equipment operated by this Corporation.

Schedule of Technical Lectures :

Detailed syllabus with regard to Technical lectures enclosed herewith.

Aircraft Availability for Training :

No separate aircraft has been kept for training purposes. However, service aircraft whenever possible is scheduled for training flights.

Number of Instructors and their Availability :

Two Instructors who are holders of Instructor's Licence are available for full time.

Number of Check Pilot :

9 effective check pilots plus 5 check pilots who carry out occasional route check and local flight training.

Training of Synthetic Ground Devices for Instrument Flying and Procedures etc. with Details of Training.

Detailed syllabus for synthetic ground devices for instrument flying etc. enclosed herewith.

At present, Air India International have 2 Link Trainers in Bombay and London, Singapore and Hong Kong bases make use of other operators' link.

Average Number of Hours per year of Training given to Each Pilot :

(a) Each Commander receives approximately 4/5 hours of refresher course and Instrument flying every year.

(b) Each co-pilot receives approximately 3/4 hours of Refresher course and Instrument flying every year.

Number of Checks and Flight Tests which may be carried out Periodically :

Two Route checks, two local Instrument flight checks and one emergency refresher check given to all pilots every year.

Training for Instrument Rating :

At present all Commanders undergo training for Instrument Rating and test before they obtain command endorsement. All holders of Instrument Rating undergo a check once a year.

Instructional Staff :

Two Flight Instructors.
One Technical Instructor.
One Navigation Instructor.
Three Link Instructors.

PILOTS INSTRUMENT PROCEDURE FLYING COURSE

INSTRUMENT PANEL FLYING SYLLABUS

o. . . . . . . Denotes not proficient.
v. . . . . . . Denotes proficient.

Flight	Link	*Introductory.*
		1. Operation of flight instruments.
		Basic panel.
		1. Instrument take-off.
		2. Climb to altitude at constant airspeed and on given heading.
		3. Instrument cruise on steady courses.
		4. Instrument cruise on steady courses with change of airspeed (160—110 mph).
		5. Steady descents at different rates.
		6. Precision rate 1 turns and 30° banked turns, Rolling out on accurate headings.
		7. 45 banked turns.
		8. Climbing and decending turns.
		9. Attitude control during operation of flaps (10° and 20° flaps).
		10. Conversions from 'cruise' to "final Holding", to "descend in approach" to "level flight", to "overshoot".
		11. Timed rate 1 turns (angle of bank-time coordination).
		12. Turn 180° and descend 500° in 1 minute.
		13. Turn 180° and convert from 'cruise' to 'final holding' in 1 minute.
		14. Descending at 500′/min., convert from "cruise" to "final holding"
		15. Turn 180 descend 500′/Min., and convert from "cruise" to "final holding" in 1 minute.

16. Descend 400′/min.—convert from "cruise" to "approach" in 1 minute.
17. "C" pattern.
18. Engine failure exercises.

Flight	Link	*Limited panel.*

1. General flying.
2. Engine failure exercise.

PILOTS INSTRUMENT PROCEDURE FLYING COURSE

RADIO COMPASS SYLLABUS

o. . . . . . Denotes not proficient.

v. . . . . . Denotes proficient.

Flight	Link	*Introductory.*

1. Discussion of Radio Compass equipment, characteristics and operation.
2. The different types of transmission stations.
3. Correct tuning methods.

Airwork (Automatic)

1. Homing.
2. Drift correction and homing on a known bearing—tracking.
3. Making good a track away from the station.
4. Intercepting and tracking on given bearings.
5. Orientation in terms of QDM and QDR.
6. Holding techniques.
7. Time and distance calculations to station.
8. Let-downs.

Manual.

1. Solving 180° ambiguity.
2. Distance calculation.
3. Tracking and passing the station.
4. Making good and outbound tracking.
5. Intercepting given bearings.
6. Boxing and let-downs.

PILOTS INSTRUMENT PROCEDURE FLYING COURSE

QDM PROCEDURES SYLLABUS

o. . . . . . . Denotes not proficient.
v. . . . . . . Denotes proficient.

Flight	Link	*Introductory.*
		1. Discussion on operation of ground equipment.
		2. Co-operation with Radio Officer.
		Airwork.
		1. Orientation and interception of given QDM's and QDR's.
		2. Bracketing and tracking along QDM or QDR lines using "QDM-D" technique.
		3. Let downs using QDM's—figures of light, etc.
		4. Full QDM distance procedure from holding facility.

PILOTS INSTRUMENT PROCEDURE FLYING COURSE

RADIO RANGE SYLLABUS

o. . . . . . . Denotes not proficient.
v. . . . . . . Denotes proficient.

Flight	Link	*Introductory.*
		1. Lecture on system.
		Air work.
		1. Bracketing and identifying cone.
		2. Orientation.
		(a) Fade 90 method.
		(b) Close-in-method.
		(c) Fade parallel method,
		(d) Fade perpendicular method.
		(e) True fade method.
		3. Orientation and let-down.
		4. Holding and let-down.

PILOTS INSTRUMENT PROCEDURE FLYING COURSE

INSTRUMENT LANDING SYSTEM SYLLABUS

o. . . . . . . Denotes not proficient.
v. . . . . . . Denotes proficient.

Flight	Link	*Introductory.*
		1. Semi-technical discussion on ground installation, including analysis of beam spread at various distances from the transmitter, beam characteristics and marker beacon arrangement.
		2. Operation of airborne equipment.
		Airwork.
		1. Bracketing localiser using QDM" D techniques.
		2. Procedure turns.
		3. Figures of eight at constant height.
		4. Bracketing glide path.
		5. Holding techniques.
		6. Full procedure on front beam from holding facility.
		7. ILS+GCA monitoring.

AIR INDIA INTERNATIONAL

INSTRUMENT FLYING SYLLABUS FOR PILOTS

Introductory.

(a) Brief talk on Instrument flying and the importance of I/F.

(b) Familiarization with the Link Machine.

Explain Basic I/F Panel.

1. Level flying with hood open —10 to 20 minutes.

2. General Instrument flying with hood closed.

3. Maintaining Course, Climb and descent at 500 per minute.

4. Talk on Rate one turns.

5. Standard rate one turns to port and starboard, maintaining heigh and speed (Pupil must time each turn).

6. Standard rate one turns with variation in height and speed, and turning on to a predetermined course.

7. General Instrument flying with limited panel. (D.G.I., turn anc bank indicator or artificial horizon.)

8. General Instrument Flying with rough air.

9. I/F pattern flying.

Tolerances :—

Height ±50
Speed ± 10 kts.
Course ± 5°
Turns through 360°—±5°
Timings —±10 seconds for rate one turn through 360°

Tolerances with rough air:— Height ± 100′
Speed ± 10 kts.
Course ± 10°
Turns through 360° ± 10° (Course)
Timing ± 20 seconds for turns through 360

V.H.F. D/F.

1. Complete talk on V.H.F. D/F system and the importance of becoming QDM conscious.

2. Various methods of picking up QDMs and QDRs (still air).

3. Figure of 8 in still air with constant height and speed.

4. Orientations to join figure of 8 pattern from various angles.

5. Figure of 8 in still air with varying height and speed.

6. Figure of 8 with winds (constant height & speed).

7. Complete talk on V.H.F. D/F let-downs, chart reading, and setting the QNH and QFE.

8. Carry out at least 3 V.H.F. D/F let down procedures with winds and full R/T pattern.

Non-Directional Beacon

(Radio Compass)

1. Complete talk on the Radio Beacon system and its application.

2. How to tune Radio Compass in the aircraft.

3. Radio Beacon tracking (still air) with constant height and speed.

4. Picking up of given QDMs and QDRs (still air).

5. Flying Radio Beacon patterns with winds.

6. Complete talk on two minute Race Course pattern and 8 different techniques of joining the same.

7. Complete talk on 4 types of procedure turns (1—45° for 45 secs., 2-38 seconds, 3-80° procedure turn, 4-15° drop methods) and how to fly them with the help of Radio Beacon.

8. Complete talk on double drift and triple drift methods.

9. Complete talk on Radio Beacon let-down chart.

10. Talk on Beacon let-down planning.

11. Carry out at least 6 Radio Beacon let-down with winds and occasional rough air.

Radio Range

1. Complete talk on Radio Range system.

2. Tuning of Radio Range signals in the aircraft.

3. Peculiarities of Radio Range signals in 'A' & 'B' quadrants.

4. Radio Range Beam familiarization without wind.

5. Holding Beam with wind.

6. Beam bracketing and flying right and edge.

7. Radio range orientations
   1. Fade parallel.
   2. Fade Perpendicular.
   3. Fade 90.

8. Talk on Radio Range let-down charts and various methods of orientating over the range station to carry out let-downs.

9. Talk on Radio Range let-down planning.

10. Carry out at least 6 Radio Range let-downs with wind and occasional rough air.

Instrument Landing System (SCS 51).

1. Complete talk on I.L.S. System.

2. How to tune Localizer and Markers in the aircraft.

3. I.L.S. Localizer beam familiarization and holding technique. (QDM direction and QDR direction).

4. Complete talk on I.L.S. chart reading.

5. Talk on I.L.S. let-down planning and setting of QNH & QFE.

6. How to work out rate of descent for various glide path angles.

7. I.L.S. let-down without winds.

8. At least 4 I.L.S. let-downs with wind & occasional rough air.

Visual Aural Range

1. Complete talk on the VAR system.

2. Tuning of VAR in the aircraft.

3. VAR aural and Visual beam familiarization.

4. Complete talk on VAR let-down chart reading.

5. Carry out at least 3 let-downs with winds and occasional rough air.

Visual Omni Range

1. Complete talk on V.O.R. system.

2. Tuning of V.O.R. in the aircraft.

3. Explain RMI and OBS in detail.

4. Take pupil to the 1049G type of aircraft for the V.O.R explanation in detail.

5. Coupling of V.O.R. with Zero Reader to be discussed later, while discussing Zero Reader.

Zero Reader

1. Complete talk on Zero Reader.

2. Explain in detail each instrument used in conjunction with Zero Reader

(a) Heading selector

(b) Selector switch

(c). Coupling switches on glare shield panel.

3. To use Zero reader while carrying out General instrument flying.

4. How to fly I.L.S. coupled to Zero Reader.

5. Take pupil to the aircraft (1049) to explain Zero Reader ground check.

6. Explain Zero Reader tolerances.

Link command course for A. I. I. Pilots

Radio and Navigation aids to be covered for the above course are as follows:—

1. V. H. F. D/F (2) Radio Beacon (3) Radio Range (4) Instrument Landing System (5) V.O.R. (6) V.A.R. (7) Zero Reader.

1. V. H. F. D/F.

(a) Should have a good knowledge of the above aid and should be able to fly QDMs and QDRs with given winds.

(b) Should be quite QDM conscious.

(c) Should be able to read V.H.F. D/F let-down charts.

(d) Should be able to carry out V.H.F. D/F let-down without any briefing.

2. Radio Beacon.

(*a*) Check his knowledge on the Radio Beacon application. (If necessary give brief revision talk).

(*b*) Should be able to carry out at least 2 types of procedure turns out of the 4 mentioned elsewhere in this syllabus.

(*c*) Should have a good idea of joining Race course pattern from various angles.

(*d*) Should be able to apply double drift and triple drift methods in Race course pattern.

(*e*) Should be able to carry out Radio Beacon exercises with the given approach time.

(*f*) Should be able to read Radio Beacon let-down charts without any difficulty. (Horizontal and vertical patterns).

(*g*) Should be able to plan Radio Beacon let-downs methodically.

(*h*) Should be able to overshoot from one aid and be able to carry out let-down on different aid without any difficulty.

(*i*) During the course, should be able to carry out 2/3 satisfactory holding and let-downs with rough air and limited panel.

(*j*) It is important that the pilot reads the check list as and when required during the let-down.

3. Radio Range.

(*a*) Check his knowledge on the Radio Range system. (If necessary, give a refresher talk).

(*b*) Should know tuning of Radio Range in aircraft for aural and visual signals.

(*c*) Should be able to find out average bi-sectors of a given Radio Range station.

(*d*) Should be able to carry out 3 types of orientations on the Range system, *i.e.*, Fade parallel, Fade perpendicular and Fade 90.

(*e*) Should be able to read Radio Range let-down charts.

(*f*) Should be able to carry out Radio Range let-downs along with overshoot.

(*g*) Should be able to plan his Range let-downs.

(*h*) It is important that the pilot reads the check list as and when required during the let-down.

4. *Instrument Landing System.*

(a) Should have thorough knowledge of I. L. S. (If necessary give a refresher talk).

(*b*) Should be able to fly I. L. S. Localizer and Glide path with and without Zero Reader with unknown winds.

(*c*) Should be able to plan I. L. S. let-downs.

(*d*) Should be able to read I. L. S. charts.

(*e*) Should be able to work out his rate of descent in still air on a given glide path.

(*f*) Should call out check list as and when required during the let-down.

(*g*) Should be able to carry out 2 I. L. S. let-downs satisfactorily including holding over Radio Range or Beacon.

(*h*) Check his knowledge of the I. L. S. equipment in the aircraft.

5. *Visual omni range.*

(*a*) Should have thorough knowledge of the V. O. R. system.

(*b*) Check his knowledge of the V. O. R. equipment in the aircraft.

6. *Visual Aural Range.*

Should have thorough knowledge of the V. A. R. system.

7. *Zero Reader.*

(*a*) Should have a thorough knowledge of the Zero Reader system and its components working in conjunction with Zero Reader.

(*b*) Should be able to explain Zero Reader when carrying out General Instrument Flying.

(*c*) Should be able to explain Zero Reader and its components while carrying out I. L. S. coupled with Zero Reader.

(*d*) Should also be able to explain when flying Zero Reader coupled with V. O. R. System.

(*e*) Should have thorough knowledge of Zero Reader tolerances.

INDIAN AIRLINES CORPORATION

General.—Pilots' training in Indian Airlines Corporation is restricted only to pilots employed by the I. A. C. for the operation of its air services. No *ab initio* training is offered. The minimum qualification of pilots joining I. A. C. is a current 'B' licence with a provisional endorsement on DC-3 type of aircraft.

The source of supply of pilots with provisional type endorsement on DC-3 type of aircraft is the Civil Aviation Training Centre, Allahabad, who undertake the training on DC-3 aircraft of pilots with commercial licence.

The training of pilots in I. A. C. is, at present, carried out at the Bases, *i.e.*, Bombay, Calcutta, Delhi and Madras. The pilots stationed at Madras come under the administrative control of the Bombay Area. Although there is no central training school in the I. A. C. at present, training carried out at the various Bases is standardised.

Training set-up.—The Base training of Pilots at the three Areas namely, Bombay, Calcutta, Delhi comes directly under the charge of the Operations Manager of the Area. At each Area, I. A. C. have Flying Instructors, a Ground Instructor (technical), Link Instructors and Navigation Instructor.

All the Flying Instructors in the I. A. C. have undergone a special Instructors' Flying Training Course with a Flying Instructor who was specially brought from K. L. M. for the purpose. A few more Instructors have since been trained in India by our Flying Instructors to meet requirements. This has ensured standardisation in the method of training adopted at the various Areas.

(1) *Training Syllabus for & type command Endorsement on existing equipment.*—We attach hereto training syllabii for type and command endorsement on DC-3 and DC-4 aircraft (Appendix A & B). The syllabus for type and command endorsement on Viking aircraft is the same as for DC-3 aircraft. The syllabus for command endorsement on Heron aircraft is the same as laid down in schedule VIII of Indian Aircraft Rules.

(2) *Refresher Course.*—All flying refresher courses are carried out normally on DC-3 aircraft. The syllabus for the refresher course is the same as laid down in the training syllabus for type and command endorsement with greater emphasis on Instrument flying.

(3) *Schedule of technical lectures.*—All the pilots employed in the I. A. C. undergo a technical refresher course with the Ground Instructor on each type of aircraft for which the licences are endorsed. In addition, whenever, a pilot is taken up for the type endorsement or command training on a new aircraft, the Ground Instructor completes its technical course with the pilot preparatory to the technical examination held by the D.G.C.A. and commencement of his flying training.

(4) *Aircraft availability for training.*—The I. A. C. have made available one DC-3 aircraft at Bombay, Madras, Delhi and Calcutta, exclusively for normal training purposes.

(5) *Number of Instructors and their availability.*—The I. A. C. have at present the following instructors available for training. :—

Bombay

Captain N.M. Pereira	D.C.4.
Captain V. K. Mehta	DC-3 & Viking.
Captain H.D. Taraporewala	DC-3 & Heron,

Madras

Captain K. G. Rao	DC-3

Calcutta:

Captain A. Sinha	DC-3 & Viking
Captain O.C. Shepherd	DC-3
Captain R.A. Williams	DC-3
Captain J.E. Isaac	DC-3
Captain H. Bhattacharjee	DC-4

Delhi:

Captain J.N. Khadiwala	DC-3 & Heron
Captain P. N. Reddy	DC-3.

In addition Capt. K.R. Jolly, Chief Pilot, Delhi Area, also assists in DC-3, Viking and Heron training in Delhi Area. We have also a Chief Flying Instructor, Capt. D.S. Jang, who carries out DC-3 Viking and Heron training whenever required. Capt. A. K. Badhwar, who had undergone Instructor's training course, was loaned to C.A.T.C., Allahabad, till recently.

Besides carrying out the base training of pilots, the Flying Instructors also fly on route whenever the training commitments make it possible for them to carry out route flights.

(6) *Number of check pilots.*—Number of check pilots, approved by the D.G.C.A. for I. A. C., is as per list attached (Appendix C).

(7) *Training of synthetic ground devices for instrument flying and procedures etc. with details of training.*—The I. A. C. have, at present, only Link Trainers of ANT-18 type; they are distributed as follows. The Link Instructors available in the Area are also given below.

	Link Trainers	Link Instructors
Bombay	2	3
Madras	1	2
Calcutta	4	3
Delhi	2	3

The syllabus for Link Training to cover Instrument Flying procedure is attached (Appendix D). Normally, all pilots in I. A. C. carry out between 2 to 4 hours link training every month. This quota of Link training is increased whenever pilots are found deficient in flying standards.

The I. A. C. have placed an order for one Redifon C-900/1 basic procedure trainer with two engines for carrying out synthetic ground training It is proposed to acquire more of such trainers as soon as possible.

(8) *Average No. of hours per year of training given to each pilot.*—It may be mentioned that all the pilots in I. A. C. are imparted 5 to 10 hours of flying training annually.

(9) *No. of Checks and flight tests.*—All pilots undergo every six months a Base Flight check of about 1½ hours duration for renewal of licences and annually an Instrument Rating Flying check of not less than one hour duration. Besides periodical Route checks are carried out by Check Pilots.

(10) *Training for Instrument rating.*—Consequent on the introduction of Instrument Rating Certificate, all commanders in I. A. C. have been given about 8 to 10 hours of flying training besides sufficient link training prior to their flight checks for grant of instrument Rating Certificates.

GENERAL

Copilots training.—The I. A. C. have adopted the following training procedure in respect of the newly recruited pilots with provisional DC-3 endorsement. They are put through a ground training course consisting of technical refresher on DC-3 aircraft, instruments and navigation courses and a course of Link training, which averages about 20 hours per pilot. On completion of this ground training, these pilots are given base flying training of about 2 to 4 hours duration and then scheduled to fly as supernumerary crew on routes for about 50 hours to acquaint themselves with enroute procedures, documentation etc. On satisfactory completion of the above course only, they are released to fly as First Officers on routes on DC-3 aircraft.

Command training.—The I. A. C. have laid down, for the present, a minimum of 1500 hours of flying experience before a pilot can be considered for command training on DC-3 aircraft. These First Officers are given a command technical course on DC-3 aircraft with our Ground Instructor and a thorough link training of about 30 hours. On satisfactory completion of the ground technical & Link training, they are taken up for flying training and the average number of hours taken by a pilot to reach the PIC standard is estimated at 20 hours approximately.

Regular classes are held for Second class navigators' licence course & Instrument Rating Technical examination at each of the Areas. These courses are conducted by Nav. Instructor at Bombay, Calcutta, Delhi & Madras, assisted by a Met. Instructor loaned by the Indian Meteorological Department.

O. Denotes "Session" but more practice necessary.

V. Denotes completed satisfactory.

1 *Transition syllabus.*

1·1 *Pre-flight training*:

1. Interpretation of I. A. C. operating instructions.
2. Revision of technical subjects combined with explanatory tour of aircraft, externally and internally.
3. Complete inspection of main cabin (emergency exits, emergency equipment).
4. Cockpit—Location of circuit breakers, generator switches, hydraulic panel, emergency exits and equipment, check operation of seats and rudder.
5. Location of controls, levers and switches.
6. Instruments, panel layout, instrument lighting and spare bulbs.
7. Read all *checklists* and discuss item by item.
8. Radio layout, tune and ground check (battery cart must be available).
9. Auto-pilot.
10. Cabin air conditioning.
11. Hydraulic and brake systems (emergency procedures)

12. Fuel and cross feed system.

13. Engine fire control (during starting, in flight)—hand extinguisher.

14. Discuss all emergency procedures (cockpit fire, cabin fire, smoke removal etc.).

15. Propeller feathering and unfeathering.

1.2. *Flight training* (X....denotes Captains only)

1.2.1 *General*

1. Use of checklist.
2. Starting engines.
3. Taxying.
4. Engine run-up.
5. Take-off.
6. Climb and climbing turns.
7. Feel of controls trimming.
8. Straight and level cruise.
9. Rate 1 and 45° banked turns.
10. Effect of power adjustments.
11. Effect of gear extension.
12. Effect of flap operation.
13. Use of auto-pilot.
14. Crossfeed operation.
15. Action in event of fire—feathering and unfeathering procedures.
16. Engine failure procedures and flying on one engine.
17. Slow flight—0° flaps—gear down—100 mph 20° banked turns.
18. Normal simulated landing circuit (at altitute).
19. Simulated single-engine landing circuit (at altitude).

1.2.2. *Circuits.*

a. Normal take-off.
b. Normal circuit.
c. Normal landing and right hand circuit.
d. Short circuits.
e. Normal overshoot.
f. Engine failure during take-off.

X. 1.3. *Advanced pre-flight training.*

a. DC-3 engine out performance evaluation.

b. Emergency flight procedures.

c. Discussion of all facets to instrument procedure flying as applicable to the DC-3.

X. 1.4. *Advanced flight training.*

X. 1. 4.1 *Circuits.*

- *a.* Shortfield take-off.
- *b.* Short Circut;
- *c.* Short Field landing.
- *d.* Engine failure after take-off.
- *e.* Engine out circuit and landing.
- *f.* Crosswind take-off.
- *g.* Crosswind landing.
- *h.* Window opea approach and landing.
- *i.* Flapless landing.
- *j.* Low circuit at circling limits.
- *k.* Glid approach and landing.
- *l.* Wave-off.

X. 1.4.2. *Instrument procedure flying.*

- *a.* Instrument take-off.
- *b.* General instrument Flying.
- *c.* Engine failure procedures.
- *d.* ILS/ADF/QDM let downs.
- O. Denotes "Session" but more practice necessary.
- V. Denotes completed satisfactory.

1. ***Transition syllabus.***

1.1 *Pre-flight training.*

1. Interpretation of I. A. C. operating instructions.
2. C.A.A. approved Airplane Operating Manual.
3. I. A. C. notices to Pilots on C-54 A aircraft.
4. I. A. C. Cruise Charts.
5. Speed limitations.
   - (a) Minimum manoeuvring speed with zero flap
     Minimum manoeuvring speed with 20° flap
     Minimum manoeuvring speed with 30° flap
     Minimum manoeuvring speed with full flap.
   - (b) Maximum speed for Landing gear.
     Landing gear flap
     Landing lights.
   - (c) Flying in turbulence.
   - (d) Operational speeds
     Vmc, V_1 and V_2
6. Revision of Technical subjects
   - (*a*) Hydraulic system.
   - (*b*) Fuel system.

(*c*) Oil system.
(*d*) Electrical system.
(*e*) Vaccum and Pilot Static system.
(*f*) De-icing system.
(*g*) Fire protecting system.
(*h*) Ventilating and heating system.

7. *Explanatory tour of aircraft externally.*
(*a*) Control surfaces.
(*b*) Landing Lights.
(*c*) Dump chutes.
(*d*) Antennas.
(*e*) Battery lift and door.
(*f*) Fire extinguisher discharge indicators.
(*g*) Main and nose wheel pins.
(*h*) Gear up latches.
(*i*) Pilot tubes.
(*j*) Belly compartment doors.
(*k*) De-icer boots.
(*l*) Tail bumper.

8. *Complete inspection of main cabin:*
(*a*) Emergency exits.
(*b*) Emergency equipment (fire-extinguisher, first aid kit, life-vests, life rafts, axes, exit rope).
(*c*) Tail access door.
(*d*) Cabin heater control panel.
(*e*) Light switches.
(*f*) Oxygen outlets.

9. *Complete inspection of Cockpit.*
(*a*) Location of circuit breakers.
(*b*) Radio equipment.
(*c*) Dome escape hatch.
(*d*) Emergency equipment.
(*e*) Heating controls.
(*f*) Cockpit lighting.
(*g*) Oxygen bottles and outlets (demonstration).
(*h*) Driftmeter.
(*i*) Check operation of pilot seats and rudder.

10. Location of controls, lever and switches.
11. Instruments, panel layout, instrument lighting and spare bulbs.
12. Auto-pilot.

13. Fire and smoke detectors—fire extinguishing system—engines fires-fuselage fires—electrical fire—smoke removal—heater fires.
14. Propeller feathering and unfeathering. Run-way propelled.
15. Operation of landing gear handle and solenoid.
16. Emergency gear extension.
17. Emergency flap extension.
18. Emergency brake operation.
19. Fuel dumping.
20. Landing flares.
21. Emergency landing.
22. Read all checklists and discuss item by item.

II. Flight Training.

General

1. Use of Checklist.
2. Egnine starting.
3. Taxying, braking and stopping.
4. Run-up.
5. Normal take-offs.
6. Climb and climbing turns.
7. Straight and level cruise-trimming.
8. Descend and descending turns.
9. Effect of power adjustments.
10. Effect of gear extension.
11. Effect of flap extension.
12. Auto-pilot operation.
13. Fuel system-crossfeeding from various tanks.
14. Level turns-20°, 30° and 45° of bank.
15. Engine fire control.
16. Three engined flight.
17. Engine failure procedure and two engined flight.
18. Approach manoeuvring 145 mph—20° flap.
19. Simulated normal landing circuit (at altitude) and overshoot.
20. Simulated three-engined landing circuit (at altitude) and Overshoot.
21. Emergency gear extension.
22. Emergency flap extension.
23. Open emergency exit (during flight).
24. Visual approach and landing.

III. *Circuits.*

1. Normal take-offs.
2. Landings:
   (*a*) Landing flap.
   (*b*) Approach flap.
   (*c*) Take -off flap.
   (*d*) Zero-flap.
3. Normal overshoot (before passing decision-to-land point).
4. Normal wave-off (after passing decision to-land-point).
5. Engine failure during take-off (occasional fire warning).
*6. Three-engined landing.
*7. Three-engined overshoot.
*8. Two engined approach and landing.
9. Cross wind take-off and landings.
10. Right and circuit.
*11. Straight-in approaches.
*12. Three-engined take-offs (one with second engine failures). (Only for those Captains who are authorised by the Airlines).
*13. Night landings (if not completed during 'instrument flying').
*14. Cockpit window open landing.
15. Wider Circuits (Not No. 1 to land).
16. Simulated all-up weight take-off.

IV. *Instrument flying* (Preferably at night).

1. Instrument take off.
2. General instrument flying.
3. I.L.S., C.C.A., QDM and/or ADF let down.
4. Overshoot after instrument approach (before passing decision-to-land point).
*5. Engine failure during let down (in holding pattern or in approach).
*6. Low circuit at circling minima (after instrument approach instrument runway not in use).

*Denotes items applicable to Captain only.

Note detailing **information regarding training facilities available with** A.I.I., I. A. C. and Non-scheduled Op**erators**.

Bharat Commerce & Industries Ltd.

The Company have only one aircraft, and as such, they **do not have any** special training facilities for their pilots.

Jamair Company (P) *Ltd.*

1. *Training syllabus for type and command endorsement on existing equipment*:

Every facility is offered to all Junior pilots to train on all routes for ultimate DC-3 endorsement as P. I. C.

2. *Refresher Courses.*

Regular checking of personnel is carried out at licence renewal date by the Company's Check Pilot.

3. *Schedule of technical lectures.*

A qualified lecturer is available daily and all pilots are required to attend.

4. *Aircraft availability for training.*

Aircraft are made available as per individual requirements.

5. *Number of Instructors and their availablity.*

Two Govt. approved Check Pilots are available at all times to impart the required practical theoretical instruction plus a qualified, full time, Link Instructor and fully qualified Navigator Instructor.

6. *Number of Check Pilot.*

Two approved.

7. *Training of Synthetic ground devices for instrument Flying and Procedures etc. with details of training.*

Link Trainer available, suitably rostered for all aircrew to take advantage of this facility.

8. *Average number of hours per year of training given to each Pilot in your organisation.*

10/15 hours.

9. *Number of Checks and Flight tests which may be carried out periodically.*

As required to suit our operations, plus the Government periodical checks

10. *Training for Instrument Rating.*

Carried out in conjunction with the previous mentioned training with emphasis on Link instruction.

INDAMER COMPANY PRIVATE LTD

1. Selection of Pilots for employment in this Company is made from experienced Pilots holding current licences indicating their standard of proficiency as checked by DGCA approved check Pilots and also from Pilots of comparatively little experience, trained and checked at C.A.T.C., Allahabad by D.G.C.A. Pilots.

2. Initial checks are carried out on new Pilots as soon as they join the Company by the Company Check Pilots. There are three such Check Pilots in Indamer Co. (P) Ltd.

3. Periodical spot checks are carried out by the Senior Check Pilot, Capt. John Brinnand at any time, to assess the existing standard of proficiency.

4. Training of Co-Pilots for Command, Captains for Instrument Ratings etc. is done by the Check Pilots during normal operations.

5. Six monthly licence renewal checks are carried out by the Check-Pilots. If a particular item is noted as needing attention the Pilot in question is flown with a Check Pilot immediately afterwards to bring the Pilot upto the standard required. Alternatively a course on the particular subject on the Link Trainer is arranged.

6. Pilot-in-Command check etc. are carried out by the Check Pilot, the D.G.C.A. Check Pilot carrying out a ratification check afterwards before the licence is duly endorsed.

7. A Link Trainer with a highly qualified Instructor has been acquired jointly by the Independent Operators and is in constant use for training both Captains and Co-Pilots.

8. Ground subjects are covered by written notes issued by the Company.

THE COMBINE PRIVATE OPERATORS' AIRLINES—CALCUTTA

PILOT INSTRUMENT FLYING TRAINER DEPARTMENT

SYLLABUS

A.—*General Instrument Flying*

Ex. 1. Straight and level flight.
2. Standard rate turns.
3. Controlled ascent and descent.
4. Ascending and descending turns.
5. Compass turns.
6. Cruising const. alt. var. speeds.
7. Timed turns and runway procedures.
8. Revision with turbulence and limited panel.

Total Time 6 *Hours.*

B.—*VHF/DF Procedures.* (*QDM's with distance*)

Ex. 1. Lecture on system.
2. Figure of eight and appro. const. alt.
3. Full approach zero wind.
4. Approach with drift.
5. Approach and overshoot drift.
6. Holding on ADF with appro. (dr. and dist.).
7. Revision with turbulence and limited panel.

Total Time 6 *Hours.*

Let down procedures for : ALL AIRFIELDS.

C.—*Beam approach system* (*SBA*)

Ex. 1. Lecture on system.
2. Figure of eight const. alt.
3. Approaches zero wind.
4. Bracketing, primary, close-in.
5. Approaches with drift and overshoot.
6. Back beam approaches.

7. Homing and approach with QDM's.
8. Homing and approach with Radio Comp.
9. Holding Buiksloot and approach.
10. Orientation.
11. Revision with turbulence and limited panel.

Total Time 10 *Hours.*

D.—*ILS* (*SCS* 51)

Ex. 1. Lecture on system.
2. Approach const. alt. loc. only.
3. Full approaches.
4. Bracketing.
5. Full approach with drift.
6. Homing and approach with QDM's.
7. Homing and approach with Radio Compass.
8. Homing from Radio Range Station.
9. Orientation.
10. Revision with turbulence and limited panel.

Total Time 10 *Hours.*

Let down procedures for : AIRFIELDS APPLICABLE.

E.—*Radio-range procedures*

Ex. 1. Lecture on system.
2. Instrument Flying Revision and Familiarisation.
3. Bracketing primary.
4. Bracketing and finding cone.
5. Orientations :—
    (*a*) Fade 90 method.
    (*b*) Close-in-method.
    (*c*) Fade par. method.
    (*d*) Fade perpendicular.
    (*e*) True Fade.
6. Orientation and let down.
7. Holding and landing procedures.
8. Beam cross country with ADF.
9. Distortion, flase fade and split beams.
10. Revision with turbulence and limited panel.

Total Time 10 *Hours.*

F.—*Radio Compass procedures*

Ex. 1. Instrument flying revision and fan.
2. Homing and drift correction.
3. Distance calculation.

4. Tracking.
5. Orientation.
6. Radio Compass let-down (Boxing).
7. Dual ADF.
8. Revision with turbulence and limited panel.

Total Time 10 *Hours.*

G.—*Other procedures*

G. C. A. Procedures & Complete check on *R T* Procedures and "Q" codes.

H.—*Short Pilots Course*

VHF/DF Procedures (QDM's with distance).

Ex. 1. Lecture on system.
2. Figure of eight and appr. const. alt.
3. Full approach and dist. zero wind.
4. Approach with dist. and drift.
5. Approach and overshoot drift.
6. Holding on ADF with appr. (dr. and drift).
7. Revision with turbulence and limited panel.

ADF Instrument Navigation

Ex. 1. Instrument precision Flying.
2. Lecture on system.
3. Homing + Tracking.
4. Low approaches.
5. Interception of predetermined course.
6. Aural Null Procedures when available.

Radio Range Procedures

Ex. 1. Lecture on system.
2. Bracketing primary.
3. Bracketing and Finding Cone.
4. Orientations :—
    (*a*) Fade 90°.
    (*b*) Fade Parallel.
    (*c*) Close-in.
    (*d*) Fade Perpendicular.
    (*e*) True Fade.

5. *Let Down Procedures*
    For all airfields applicable.
6. Standard Holdings.
7. A. D. F. Holdings.
8. Final Check out. Revision with limited Panel and turbulence. Distortion, flase fades, split and bent beams.

APPENDIX 10

SYNTHETIC FLIGHT TRAINER INSTRUCTOR REQUIREMENT

The students are available for only 14½ months. The remaining 9½ months are assumed to be lost in vacation ground instructions initial flying training etc. By assuming 22 working days per month, the total working days available for this purpose will be 319.

The syllabus to be completed is 55×75 hrs., or 4125 hours, presuming the number of trainees as 55*. About 14 Flying Instructors will also require refresher training on Synthetic Flight Trainer at the rate of 50 hours per year per Instructor. Total Synthetic Flight Trainer hours required over a period of two years will, therefore, be (4125+1400) 5525 hours.

If the Link Training Department makes a production of 16 hours per day, the total will be 319× 16 or 5104 hours.

To make 16 hours' production, there should be 2 serviceable Synthetic Flight Trainers available throughout with one extra as standby.

Instructors will only be able to do about 4 hours of '*actual instructional running time*' after allowing for a short break and about 1½ hours for briefing and de-briefing pupils.

Working two shifts per day, 4 Instructors would be required.

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*It is considered that during the first year the trainees whose progress is doubtful would be eliminated. For Link Trainers, it has therefore, been assumed that 25 pupils will be available in the Senior Course and 30 in the Junior Course.

SYLLABUS FOR SYNTHETIC FLIGHT TRAINER

Instrument Flying

(1) Familiarisation open hood	·45
(2) A. S. changes constant power	·45
(3) A. S. changes constant vert. speed	·45
(4) V. S. changes constant A. S.	·45
(5) A. S. and V. S. changes	1·30
(6) Introduce rough air and repeat	·45
(7) Rate 1 turns. Checked by timing	·45
(8) Compass flying, heading changes	1·30
(9) Introduce D. I. Headings	1·30
(10) Rate 1/2—Rate 1 1/2—Rate 2 turns	·45
(11) Climbing and descending turns	1·30
(12) Limited panel without gyro's	·45
(13) Stalling—Spinning—Recovery	·45
(14) Repeat and T figure	·45
(15) Repeat and U figure	1·00
(16) Repeat and H figure	1·00
(17) Final test and K figure	1·00
Total	16·30

Q. D. M. Flying

(1) Homing no wind	1·00
(2) Homing with wind	2·00
(3) Visualising of position by picking up given Q. D. Ms.	1·30
(4) 45° system picking up a given Q. D. M.	1·30
(5) Same with wind	1·30
(6) Q. D. M.—Q. G. E. no wind	2·00
(7) Same with wind and rough air	2·00
(8) Q. G. H. landing procedure	2·00
Total	13·30

Radio Compass Flying

(1) Introduction and homing no wind	1·00
(2) Homing with wind	2·00
(3) Picking up a given Q. D. M. and Q. D. R.	2·00
(4) Holding no wind	1·00
(5) Same with wind	2·00
(6) Wing tip procedure	1·00
(7) R/C let down on airfields in India	8·00
Total	17·00

I. L. S.

(1) Introduction and Flying the beam (figure of eight)	1·00
(2) Same with wind	1·00
(3) I. L. S. let down	3·00
(4) Beam measuring	1·00
(5) Holding over a marker	1·00
(6) Combined R/C holding and I. L. S. let down	2·00
(7) I. L. S. let downs for Indian airports	3·00
Total	12·00

Radio Range

(1) Bracketing no wind	1·00
(2) Same with wind Picking up R/R legs by.	1·00
(3) True fade out method	1·00
(4) 90° method	1·00
(5) Fade 90° method	1·00
(6) Fade parallel	1·00
(7) Fade perpendicular	1·00
(8) R/R let downs on Indian airports	6·00
(9) Flying airways combining R/R and R/C	2·00
Total	15·00
Final Test	1·00

Total time 75 hours.

APPENDIX II

DIRECTOR GENERAL OF CIVIL AVIATION'S PROPOSED DRAFT FOR PILOTS' LICENCES

Student Pilot's Licence

Applicant for a Student Pilot's Licence shall meet the following requirements.

1. *Age.*—He shall be not less than 17 years of age.

2. *Medical Fitness.*—He shall produce a certificate of physical fitness in form C. A. No........., from a Registered Medical Practitioner on undergoing a medical examination, during which he shall have established his medical fitness on the basis of compliance with the following requirements :

Physical requirement	No. 3
Visual requirement	No. 3
Colour perception requirement	No. 2
Hearing requirement	No. 4

as laid down in Appendix I to these rules.

3. *Knowledge.* He shall pass an oral examination in the following subjects :

(1) Air Legislation, mainly pertaining to flights conducted under V. F. R. and flights in and around aerodromes.

(2) Engineering mainly pertaining to the aircraft concerned, its characteristics, performance etc., and general principles of theory of flight.

(3) Meteorology—Elementary knowledge of basic meteorological phenomena such as winds, turbulence etc. in relation to cross-country flights.

The examination shall be conducted by a board constituted and approved by the D. G. C. A.

4. *Validity.*—Licence shall be valid for a maximum period of 12 months from the date of the successful medical examination. Licence shall automatically lapse on the holder obtaining any other Pilot's licence.

5. *Renewal.*—Licence may be renewed for a period of 12 months from the date of a fresh successful medical examination.

6. *Aircraft Rating.*—Lists the types of aircraft the holder is entitled to fly. Types shall be entered as recommended by the approved board as mentioned in Para. 3 above provided that no aircraft shall be entered, which has a gross weight in excess of 1500 kgs.

7. *Privileges.*—Subject to the endorsements and ratings in the licence, the holder of a Student Pilot's Licence is entitled to fly as Pilot-in-Charge of any aircraft endorsed in his licence for purposes of obtaining any Pilot's Licence, within Indian territory only, provided that,

(1) he shall fly at all times under the authority and supervision of an Instructor,

(2) he shall fly only by day under V. F. R. conditions,

(3) he shall not carry passengers, or fly for hire, reward or remuneration of any kind,

(4) he shall not undertake cross-country flights without completing a minimum of 10 hrs. Solo flying time.

8. *Explanation.*—No licence is required for dual flying, by a Student Pilot under instruction, provided an Instructor is on board the aircraft.

Private Pilot's Licence

Applicant for a Private Pilot's Licence shall meet the following requirements :

1. *Age.*—He shall be not less than 17 years of age.

2. *Medical Fitness.*—He shall produce a certificate of Physical fitness in form C. A........., from a Registered Medical Practitioner on undergoing a medical examination during which he shall have established his medical fitness, on the basis of compliance with the following requirements :—

Physical requirement	No. 3
Visual requirement	No. 3
Colour perception requirement	No. 2
Hearing requirement	No. 4

as laid down in Appendix I to these rules.

3. *Knowledge.*—He shall pass a written examination in the following subjects :—

Paper I. (A) Indian and International Air Legislation together with flight rules and procedures.

(B) Elementary principles of Navigation including use of aeronautical charts.

Paper II.—Meteorology—Elementary Meteorology in relation to cross-country flights.

Paper III.—Engineering—including theory of flight, compasses, airframes, engines, both general and specific to type of aircraft concerned. Syllabus for each subject is given in Appendix II to these rules.

4. *Experience.*—He shall produce evidence of having satisfactorily completed not less than 40 hours of flight time, dual and solo of which,

(1) not less than 20 hrs. shall be as Solo flight time,

(2) not less than 5 hrs. shall be of cross-country flight time, as the sole occupant of the aircraft, including a round trip flight to an aerodrome not less than 75 nautical miles distance from the point of departure and including not less than two full stop landings at different points along with route. [This flight time may be included in Clause (1) above].

Recent experience.—Out of the 20 hrs. total Solo time required, not less than 10 hrs. shall have been completed during the twelve months immediately preceding the date of application for the licence and must include the cross-country flight mentioned in Clause (2) above, as well as the flying tests prescribed under Para. 5 below.

5. *Skill.*—He shall undergo successfully the following flying tests During the flying tests a candidate shall be assessed on his general flying ability, particularly on his sense of alertness, his reactions to various situations and his coordination and smoothness in different manoeuvres.

(1) *Ground handling of aircraft.*—including pre-flight inspection, cockpit checks, starting and running up procedures, taxying, and airmanship.

(2) *Take-offs and initial climb.*—including cross-wind take-off, application of power, straight climbing and engine failure after take-off.

(3) *General flying.*—including straight and level flying, climbing turns, decending turns with and without power, medium and steep turns with various degrees of bank, approach to a stall and recovery* and action in the event of fire.

(4) *Landings.*—including cross-wind landing, precautionary landing forced landing, and overshoot procedure from a powered approach.

IN ADDITION FOR MULTI-ENGINED AIRCRAFT

(5) All manoeuvres used in normal flight with one engine inoperative.

(6) Approach, landings and overshoot with one engine inoperative.

(7) Emergencies peculiar to the aircraft.

*NOTE.—Approach to a stall and recovery, shall be carried out only on types of aircraft and from minimum altitudes previously approved by the Civil Aviation Department.

6. *Validity.*—Licence shall be valid for periods as shown below :—

If the applicant is below 38 years of age—for 24 months:

If the applicant is above 38 years of age—for 12 months:

The period of validity shall begin from the date of the successful medical examination, except when an applicant is medically examined during 30 days immediately preceding the date of expiry of the licence, the validity period shall begin from the date of expiry of the licence.

7. *Renewal.*—Licence will be renewed on production of satisfactory evidence of a successful medical examination and proof of recent flying experience as detailed below :—

An applicant for renewal of a licence must have completed not less than 10 hrs. flight time as Pilot-in-Command during the 12 months immediately preceding the date of application for renewal. An applicant for renewal of a licence, who does not have the required recent flying experience, shall have to undergo the flying tests as laid down in Para. 5 above.

8. *Ratings.*—(1) Aircraft rating—lists the types of aircraft the holder is entitled to fly except that an open rating for all aircraft upto 1500 kgs. gross weight may be granted to a person who has completed not less than 500 hrs. flight time as Pilot-in-Command and has at least four different types of aircraft endorsed in the aircraft rating of his licence.

(2) Night rating—entitles holder to carry passengers at night. Requirements are :—

(*a*) he must have completed not less than 50 hours flight time a Pilot-in-Command, and as Sole manipulator of the controls including not less than 5 hrs. by night, which must include minimum of 5 take-offs and 5 landings ; and

(*b*) he must have completed not less than 5 hrs. dual instruction in instrument flying, which may include not more than 2½ hrs. on an approved synthetic ground device.

Night rating is valid only when the holder has, in the immediately preceding six months carried out five take-offs and five landings by night as Pilot-in-Command.

(3) Instrument Rating—entitles holder to fly under I. F. R. Requirements are listed separately.

9. *Extension of Aircraft rating.*—For extension of licence to include an additional type of aircraft in the aircraft rating of the licence, an applicant shall be required to produce evidence of having passed a written examination in paper III Engineering, as mentioned in Para. 3 above, and of having passed in the flying tests as laid down in Para. 5 above, in respect of the type of aircraft for which the aircraft rating is desired. The flying test must be passed during the 6 months, immediately preceding the date of application for extension of the licence.

10. *Privileges.*—Subject to the endorsement and ratings in the licence, the privileges of the holder of a Private Pilot's licences, shall be to act, but not for remuneration, as Pilot-in-Command or as Co-pilot of any aircraft, which is endorsed in the aircraft rating of the licence and carry passengers therein, provided that no flight is undertaken for hire, or remuneration of any kind whatsoever and provided further that passengers are carried by night only with a valid night rating.

Commercial Pilot's Licence

Applicant for a Commercial Pilot's licence shall meet the following requirements :—

1. *Age.*—He shall be not less than eighteen years of age.

2. *Medical Fitness.*—He shall produce a certificate of physical fitness in form C. A........., from an officially recognised Medical Board, on undergoing a Medical Examination during which he shall have established his medical fitness on the basis of compliance with the following requirements.

Physical requirement	No. 1
Visual requirement	No. 1
Colour perception requirement	No. 2
Hearing requirement	No. 3

as laid down in Appendix I to these rules.

3. *Knowledge.*—He shall pass examinations in the following subjects :—

Paper I.—Indian Air Legislation and International Aviation Law including Air Traffic Control practices and procedures as well as procedures regarding operation of aircraft.

Paper II.—Flight Navigation, including flight planning and navigation instruments.

Paper III.—Elementary meteorology including simple analysis of weather maps and meteorological reports.

Paper IV.—Engineering—including Theory of flight, aircraft operating limitations, Airframes, Engines, and Instruments. The Examination shall consist of written papers and may include a practical test.

Syllabus for each subject is given in Appendix II to these rules.

4. *Experience.*—He shall produce evidence of having completed not less than 250 hours of flight time, which shall include :

(*i*) not less than 150 hrs. as Pilot-in-Command, of which not less than 30 hrs. shall be within a period of twelve months prior to the date of application for licence,

(*ii*) not less than 20 hrs. of cross-country flight time as Pilot-in-Command including one flight of not less than 300 nautical miles in the course of which not less than two full stop landings at different points shall be made,

iii) not less than 10 hrs. of instrument time of which not more than five hrs. may be on an approved synthetic ground device,

(*iv*) not less than 5 hrs. of flight by night including a minimum of ten take-offs and ten landings by night as Pilot-in-Command and as Sole manipulator of the controls.

Other requirements.—He shall be in possession of a current certificate of competency, for operation of Radio Telephony apparatus on board an aircraft as issued by the Ministry of Transport and Communications—Wireless Planning Branch.

5. *Skill.*—He shall undergo successfully the following flying tests :—

(A) General flying test—Day.

(B) General Flying test—Night.

(C) Cross-country test—Day.

(D) Cross-country test—Night.

The flying tests mentioned above must be carried out on the type of aircraft to which the application for licence relates. All the tests must be completed within 12 months immediately preceding the date of application for licence.

A. *General flying test by Day*—shall comprise of the following items.

(1) *Ground handling of aircraft*—including pre-flight inspection, starting and running up procedures, cockpit procedures, taxying, airmanship etc.

(2) *Take-off and initial climb*—including precautions before lining up, application of power, maintaining of direction and rate of climb, handling after getting airborne, and straight climbing; cross-wind take-off.

(3) *General flying*—including straight and level flying, timed and rated turns, (with varying degrees of bank) on different heading, climbing turns, descending turns with and without power, medium and steep turns ; solely by reference to instruments to carry out, straight ascents and descents, level turns on various headings and holding of headings.

(4) *Stalling and Spinning*—(this should be carried out only on types of aircraft, and from minimum altitude, previously approved by the Civil Aviation Department).

(5) *Landings*—including, precautionary landing, forced-landing, and cross-wind landing, and overshoot procedures from a powered approach.

FOR MULTI-ENGINED AEROPLANES, TEST SHALL ALSO INCLUDE

At maximum landing weight :

(6) All manoeuvres used in normal flight including take-offs and landings.

(7) Landings with one engine inoperative using alternate engine(s).

(8) Emergency manoeuvres including simulated engine failure after take-off.

(9) Approach to a stall and recovery.

(To be carried out only on types of aircraft and from minimum altitudes previously approved by the Civil Aviation Department).

B. *General flying test by Night*—shall comprise of the following :—

1. Take-offs.
2. Landings.
3. General flying including turns of different configurations
4. Emergencies peculiar to the aircraft.

FOR MULTI-ENGINED AEROPLANES, TEST SHALL ALSO INCLUDE

5. At maximum landing weight all manoeuvres used in normal flight including take-offs and landings.

6. With one engine inoperative using alternate engine(s) all manoeuvres used in normal flight including landings.

C. *Cross-country flying test by Day*—shall consist of a triangular flight of not less than 300 nautical miles, and in the course of which at least two full stop landings at different points along the route shall be made. (No instructor required to be on board).

D. *Cross-country flying test by Night*—shall consist of a triangular flight of not less than 120 nautical miles, returning to the place of departure without landing elsewhere. Assessment will be on candidate's ability in navigating and flying accurately at night by use of all available aids to navigation, use of R/T equipment, R/T procedures including obtaining and using of radio bearings for fixing position and homing

6. *Validity.*—Licence shall be valid for periods as shown below :—

If the applicant is below 38 years of age—For 12 months. If the applicant is above 38 years of age—For 6 months. The period of validity shall begin from the date of the successful medical examination, except when a candidate has been medically examined during 30 days immediately preceding the date of expiry of the licence, the validity period shall begin from the date of expiry of the licence.

7. *Renewals.*—Licence will be renewed on production of satisfactory evidence of a successful medical examination, and proof of recent flying experience as detailed below. Applicant shall also produce evidence of having a current certificate of competency for operation of Radio Telephony apparatus on board an aircraft as issued by the Ministry of Transport and Communications—Wireless Planning Branch.

An applicant for renewal of a licence must have completed not less than 10 hrs. of flying time including two hrs. of night flight time, during the twelve months immediately preceding the date of application for renewal.

An applicant for renewals of a licence who does not have the required recent flying experience, shall have to undergo the general flying tests by day and night as laid down in Para. 5, Clauses A and B above.

8. *Ratings.*—

(1) *Aircaft rating*—lists the types of aircraft the holder is entitled to fly, except that an open rating for all aircraft upto 1500 kgs. gross weight may be granted to a person who has completed a total of 1000 hrs. flight time inclusive of not less than 500 hrs. as Pilot-in-Command, and has at least four different types of aircraft endorsed in the aircraft rating of his licence.

(2) *Instructor ratings*—entitle holder to impart flying instruction on aircraft types indicated on the rating. Requirements are listed separately.

(3) *Instrument rating*—entitles holder to fly under I. F. R. Requirements are listed separately.

9. *Extension of Licence.*—For extension of licence to include an additional type of aircraft in the aircraft rating of the licence, an applicant shall be required to produce evidence of having passed in a written examination in Paper IV Engineering—as given in Para. 3 above, and of having passed in the General flying tests as laid down in Para. 5. Clauses A and B above, in respect of the type of aircraft for which the aircraft rating is desired.

The flying test must be passed during the six months, immediately preceding the date of application for extension of the licence.

10. *Privileges.*—Subject to the endorsements and ratings in the licence the privileges of the holder of a Commercial Pilot's Licence shall be to act as :—

(A) Pilot-in-Command of any aircraft not exceeding 5700 kgs. gross weight, which is endorsed on his licence, provided, that when passengers are to be carried at night, he shall have carried out during the six months immediately preceding the intended flight not less than 10 take-offs and 10 landings by nightas Pilot-in-Command.

(B) A Co-pilot of any aircraft, where a Co-pilot is required to be carried and which is endorsed on his licence.

Provided that for all flights under I. F. R. either as Pilot-in-Command or as Co-pilot, he shall hold a current Instrument Rating.

SENIOR COMMERCIAL PILOT'S LICENCE

Applicant for a Senior Commercial Pilot's Licence shall meet the following requirements.

1. *Age.*—He shall be not less than 21 years of age.

2. *Medical Fitness.*—He shall produce a certificate of Physical fitness in form No. C. A............from an officially recognised medical board on undergoing a medical examination during which he shall have established his medical fitness on the basis of compliance with the following requirements :

Physical requirement	No. 1
Visual requirement	No. 1
Colour perception requirement . . .	No. 2
Hearing requirement	No. 2

as laid down in Appendix I to these rules.

3. *Knowledge.*—He shall pass examinations in the following subjects.

Paper I.—Indian Air Legislation and International Aviation Law, Air Traffic Control practices and procedures, as well as procedures pertaining to operation of aircraft.

Paper II.—Flight Navigation including Form of Earth, Use of Charts and Maps, Instruments, Compasses and D.R. Navigation.

Paper III.—Flight planning including preparation of a flight plan, use of radio aids to navigation calculation of E.T.A. etc.

Paper IV.—Meteorology (*i*)

Paper V.—Meteorology (*ii*)

Paper VI.—Engineering-including Theory of flight aircraft operating limitation Principles of loading and weight distribution, airframes, engines and instruments. The examination shall consist of written papers and may include a practical test also. Syllabus for each subject is given in Appendix II to these rules.

4. *Experience.*—He shall produce evidence of having completed not less than 1200 hrs. of total flight time within the preceding 5 years which shall include,

(*a*) not less than 250 hrs. as Pilot-in-Command or as Co-pilot performing under supervision of a Pilot-in-Command the duties and functions of a Pilot-in-Command, or any combination thereof, provided at least 100 hrs. of these shall be cross-country flight time including not less than 25 hrs. by night.

(*b*) not less than 500 hrs. as cross-country flight time,

(*c*) not less than 50 hrs. of night flight time,

(*d*) not less than 50 hrs. of instrument time under actual or simulated conditions of which not less than 25 hrs. shall have been in actual flight,

(*e*) not less than 150 flight time completed within a period of 12 months immediately preceding the date of application.

Other Requirements.—(*i*) He shall be a holder of a current commercial pilot's licence,

(*ii*) he shall be in possession of a current certificate of competency for operation of Radio Telephony apparatus on board an aircraft as issued by the Ministry of Transport and Communications,--Wireless Planning Branch.

5. *Skill.*—He shall undergo successfully the following flying test.

A—General flying test by Day.

B—General flying test by Night.

The flying tests given above shall be carried out on the type of aircraft to which the application relates. All the tests must be completed within 6 months immediately preceding the date of application for licence.

A.—*General flying test by Day.*—shall comprise of the following :

(1) *Ground Handling of aircraft.*—including pre-flight inspection, starting and running up procedures, taxying, airmanship etc.

(2) *Take-offs and initial climb.*—including precautions before lining up, application of power, maintaining of direction and rate of climb, handling after getting airborne, straight climbing etc., cross-wind take-off.

(3) *General flying.*—including straight and level flying, timed and rated turns (with varying degrees of bank) on different headings, climbing turns, descending turns with and without power, medium turns and steep turns; Solely by reference to instruments to carry out, straight and level flying, rated turns on given headings, timed turns with varying degrees of bank, straight ascents and straight descents, descending turns.

(4) *Manoeuvres at slow speed.*—straight and level flying, and climbing and descending turns at lowest safe cruising speeds and return to normal cruising speeds.

(5) *Stalling and Spinning.*—(to be carried out only on types of aircraft and from minimum altitudes previously approved by the Civil Aviation Department).

(6) *Landings.*—including precautionary landing, forced-landing, cross wind landing, and overshoot procedures from a powered approach.

FOR MULTI-ENGINED AEROPLANES, TEST SHALL ALSO INCLUDE

At maximum landing weight.

(7) All manoeuvres used in normal flight including take-offs and landings.

(8) Landings with one engine inoperative using alternate engine(s).

(9) Emergency manoeuvres including simulated engine failure after take-off.

(10) Approach to a stall and recovery (to be carried out only on types of aircraft and from minimum altitudes previously approved by the Civil Aviation Department).

B. General flying test by Night.—shall comprise of the following :

(1) Take-offs.

(2) Landings.

(3) General flying including turns of differenct configurations.

(4) Emergencies peculiar to the aircraft.

FOR MULTI-ENGINED AEROPLANES, TEST SHALL INCLUDE

(5) At maximum landing weight all manoeuvres used in normal flight including take-offs and landings.

(6) With one engine inoperative using alternate engine (s) all manoeuvres used in normal flight including landings.

6. *Validity.*—Licence shall be valid for a maximum period of 6 months from the date of the successful medical examination except when a candidate has been medically examined during 30 days immediately preceding the date of expiry of the licence, the validity period shall begin from the date of expiry of the licence.

7. *Renewal.*—Licences will be renewed on production of satisfactory vidence of a successful medical examination and proof of recent flying experience as detailed below :

An applicant for renewal of a licence must have completed not less than 20 hrs. of flight time during the six months immediately preceding the date of application for renewal. An applicant for renewal of a licence who does not have the required recent flying experience shall have to undergo the general flying test by Day and Night as laid down in Para. 5. Clauses A and B above.

In either case, he shall have to submit a proficiencey check report from an approved check pilot on a prescribed proforma. The check shall be carried out on a type of aircraft normally flown by the applicant concerned. An applicant for renewal of a licence shall also produce evidence of having a current certificate of competency for operation of Radio Telephony apparatus on board an aircraft as issued by the Ministry of Transport and Communications—Wireless Planning Branch.

8. *Rating.*—(1)Aircraft rating--lists the types of aircraft the holder is entitied to fly except that an open rating for all aircraft, upto 2500 kgs. gross weight, may be granted to a person who has completed a total of 3000 hrs. flight time, or not less than 1000 hrs. as Pilot-in-Command and, who has at least four different types of aircraft endorsed in the aircraft rating of his licence.

For inclusion of a type of aircraft having a gross weight of 5700 kgs. and above, but not exceeding 14000 kgs. gross weight an applicant shall have to produce evidence of having completed on the type of aircraft desired to be included, not less than 300 hrs. of flight time, out of which not less than 100 hrs. of flight time shall be as a Co-pilot performing, under supervision of a Pilot-in Command the duties and functions of a Pilot-in-Command. This requirement may be waived by the D.G.C.A. under special circumstances in the case of an experienced pilot who has successfully completed any specially approved course of training.

(2) *Instructor rating.*—entitles holder to impart flying instruction on types of aircraft mentioned in the rating. Requirements are listed separately.

(3) *Instrument rating.*—entitles holder to fly under I.F.R. Requirements are listed separately.

9. *Extension of Licences.*—For extension of a licence to include an additional type of aircraft in the aircraft rating of the licence, an applicant shall, subject to the conditions mentioned under aircraft rating Para. 8 above, be required to produce evidence of having passed in Paper VI Engineering, as mentioned in Para. 3 above and of having passed in the General flying tests as laid down in Para. 5, Clauses A and B above, in respect of the type of aircraft for which the aircraft rating is desired. The flying tests must be completed during the six months immediately preceding the date of application for extension of the licence.

10. *Privileges.*—Subject to the endorsements and ratings in the licence the privileges of the holder of a Senior Commercial Pilot's licence, shall be:

(*i*) to exercise all the privileges of the holder of a Private and a Commercial Pilot's Licence;

(*ii*) to act as Pilot-in-Command of any aircraft not exceeding 14000 kgs. gross weight and which is endorsed on his licence; and

(*iii*) to act as a Co-pilot in any aircraft where, a Co-pilot is required to be carried, and which is endorsed on his licence;

Provided that for all flights under I.F.R. either as Pilot-in-Command or as Co-pilot, he shall hold a current Instrument Rating.

AIRLINE TRANSPORT PILOT'S LICENCE

Applicant for an Airline Transport Pilot's Licence shall meet the following requirements.

1. *Age.*—He shall be not less than 21 years of age.

2. *Medical Fitness.*—He shall produce a certificate of physical fitness in form C. A.........from an officially recognised medical board, on undergoing a medical examination during which he shall have established his medical fitness on the basis of compliance with the following requirements :

Physical requirement	No. 1
Visual requirement	No. 1
Colour perception requirement . . .	No. 2
Hearing requirement	No. 1

as laid down in Appendix I to these rules.

3. *Other requirements* :—

(*a*) He shall be a holder of a valid Senior Commercial Pilot's Licence, with a current Instrument Rating.

(*b*) He shall be in possession of a current certificate of competency for operation of Radio Telephony apparatus on board an aircraft as issued by the Ministry of Transport and Communications—Wireless Planning Branch.

4. *Knowledge.*—He shall pass written examinations in the following subjects.

Paper I.—Flight Navigation, including form of earth, use of charts and maps, instruments, compasses, deadreckoning navigation and radio navigation.

Paper II.—Engineering including airframes, engines, aircraft operating limitations, and principles of loading and weight distribution, their effects on flight characteristics of an Aircraft.

Syllabus for each subject is given in Appendix II to these rules.

5. *Experience.*—He shall produce evidence of having completed not less than 2000 hrs. flight time within the previous 5 years, which shall include :

(A) not less than 500 hrs. as Pilot-in-Command or as Co-pilot actually performing under supervision of a Pilot-in-Command the duties and functions of a Pilot-in-Command or any combination thereof, provided, at least 200 hrs. out of these shall be cross-country flight time, of which at least 50 hrs. shall be flight by night,

(B) not less than 1000 hrs. cross-country flight time in all,

(C) not less than 100 hrs. night flight time,

(D) not less than 100 hrs. of instrument time under actual or simulated instrument conditions, of which not less than 50 hrs. shall have been in actual flight,

(E) not less than 150 hrs. flight time completed within a period of 12 months immediately preceding the date of application.

4. ***Skill.***—He shall undergo successfully the following flying tests.

(A) General flying test by Day.

(B) General flying test by night.

These flying tests shall be carried out on the type of aircraft to which the application relates.

All the above flying tests must be completed within 6 months immediately preceding the date of application for licence.

A : *General flying test by Day.*—shall comprise of the following :

(1) *Ground handling of aircraft.*—including pre-flight inspection, starting and running up procedures, taxying, airmanship etc.

(2) *Take-off and initial climb.*—including precautions before lining up, application of power, maintaining of direction and rate of climb, handling after getting airborne, straight climbing etc. cross-wind take-off.

(3) *General flying.*—including straight and level flying, time and rates turns (with varying degrees of bank) on different headings, climbing turns, descending turns with and without power, medium turns and steep turns : Solely by reference to instruments to carry out, straight and level flying, rated turns on given headings, timed turns with varying degrees of bank, straight ascents and straight descents, descending turns.

(4) *Manoeuvres at slow speed.*—straight and level flying, and climbing and descending turns at lowest safe cruising speeds and return to normal cruising speeds.

(5) *Stalling and Spinning.*—(to be carried out only on types of aircraft and from minimum altitudes previously approved by the Civil Aviation Department).

(6) *Landings.*—including precautionary landing, forced-landing, cross-wind landing, and overshoot procedures from a powered approach.

FOR MULTI-ENGINED AEROPLANES, TEST SHALL ALSO INCLUDE

At maximum landing weight.

(7) All manoeuvres used in normal flight including take-offs and landings.

(8) Landings with one engine inoperative using alternate engine(s).

(9) Emergency manoeuvres including simulated engine failure after take off.

(10) Approach to a stall and recovery (to be carried out only on types of aircraft and from minimum altitudes previously approved by the Civil Aviation Department).

B : *General flying test by Night.*—shall comprise of the following :

(1) Take-offs.

(2) Landings.

(3) General flying including turns of different configurations.

(4) Emergencies peculiar to the aircraft.

FOR MULTI-ENGINED AEROPLANES, TEST SHALL INCLUDE

(5) At maximum landing weight all manoeuvres used in normal flight including take-offs and landings.

(6) With one engine inoperative using alternate engine(s), all manoeuvres used in normal flight including landings.

7. *Validity*.—Licence shall be valid for a maximum period of six months from the date of the successful medical examination, except when a candidate has been medically examined during 30 days immediately preceding the date of expiry of the licence, the validity period shall begin from the date of expiry of the licence.

8. *Renewal*.—Licence will be renewed on production of satisfactory evidence of a successful medical examination, and proof of recent flying experience as detailed below :

An applicant for renewal of a licence must have completed not less than 10 hrs. of flight time as Pilot-in-Command or not less than 20 hrs. flight time as a Co-pilot performing under supervision of a Pilot-in-Command the duties and functions of a Pilot-in-Command, during the 6 months immediately preceding the date of application for renewal. An applicant who does not have the required recent flying experience shall have to undergo the flying tests as laid down in Para. 6 above.

In either case, he shall have to submit a Proficiency Check Report from an approved Check Pilot on a prescribed proforma. The Check shall be carried out on a type of aircraft normally flown by the applicant concerned.

An applicant for renewal of a licence shall also produce evidence of having a current certificate of competency for operation of Radio Telephony apparatus on board an aircraft as issued by the Ministry of Transport and Communications—Wireless Planning Branch.

9. *Ratings* :—

1. *Aircraft Rating*.—Lists the types of aircraft the holder is entitled to fly except that an open rating for all aircraft upto 5700 kgs. gross weight, may be granted to a person who has completed not less than 1000 hrs. flight time as Pilot-in-Command on any aircraft having a gross weight of 14000 kgs. or above. For inclusion of a type of aircraft having a gross weight of 14000 kgs. and above, an applicant shall have to produce evidence of having completed on the type of aircraft desired to be included not less than 300 hrs. flight time as a Co-pilot, and not less than 100 hrs. flight time as a Co-pilot performing under supervison of a Pilot-in-Command, the duties and functions of a Pilot-in-Command.

This requirement may be waived by the D.G.C.A., under special circumstances in the case of an experienced pilot who has successfully completed any specially approved course of training.

2. *Instructor Ratings* :—Entitle holder to impart flying instruction on types of aircraft mentioned in the rating. Requirements are listed separately.

10. *Extension of Licences* .—For extension of a licence to include an additional type of aircraft in the aircraft rating of the licence, an applicant shall, subject to the conditions mentioned under aircraft rating, Para. 9 above, be required to produce evidence of having passed in Paper IV Engineering—as laid down in Para. 4 above and of having passed in the General flying tests as laid down in Para. 6, A and B above, in respect of the type of aircraft for which the aircraft rating is desired. The flying tests must be passed during the six months immediately preceding the date of application for extension of the licence.

11. *Privileges* :—Subject to the endorsements and ratings in the licence, privileges of the holder of an Airline Transport Pilot's licence shall be :

(A) to exercise all the privileges of a holder of a Senior Commercial Pilot's Licence, and of an Instrument Rating,

(B) to act as a Pilot-in-Command or as a Co-pilot on any aircraft endorsed in the aircraft rating of his licence.

INSTRUMENT RATING

Applicant for an Instrument Rating shall meet the following requirements.

1. *Qualifications.* —

(A). He shall be a holder of a Valid Pilot's Licence.

(B) He shall be a holder of a current certificate of competency for operation of Radio Telephony apparatus on board an aircraft as issued by the Ministry of Communications—Wireless Planning Branch.

2. *Medical Fitness.*—He shall produce a certificate of physical fitness in form C. A................., from an officially recognised medical board on undergoing a medical examination during which he shall have established his medical fitness on the basis of compliance with the following requirement.

Hearing requirement No. 1

as given in Appendix I to these rules.

3. *Knowledge.*—He shall pass written examinations in the following subjects:

Paper I. Flight Navigation, including use of aeronautical charts dead-reckoning and radio navigation and use and adjustment of flight instruments.

Paper II. Flight planning, including preparation of a flight plan taking into consideration the A.T.C. requirements, aircraft performance and forecast met. conditions etc.

Paper III. Elementary Meteorology, elementary principles of forecasting and the arrangements and procedures for the issue of aviation meteorological reports.

Syllabus for each subject as given in Appendix II to these rules.

4. *Experience* :—He shall produce evidence of having completed

(1) not less than 150 hrs. flight time as Pilot-in-Command, including not less than 50 hrs. of cross-country time.

(2) not less than 40 hrs. of instrument time of which not more than 20 hrs. shall be instrument ground time.

A minimum of 5 hrs. of instrument time shall have been completed within six months immediately preceding the date of application for the instrument rating.

5. *Skill.* —He shall successfully undergo an Instrument Rating flight test, within six months immediately preceding the date of application for the rating.

Instrument Rating Flight Test—shall comprise of the following :

(A) General Instrument Flying.

(B) Airways Procedures.

(C) Descent through cloud or let-down procedures.

(D) Overshoot procedures.

(A) *General Instrument flying will include* :

(*i*) Pre-flight check covering all items required for an instrument flight,

(*ii*) change over to instruments after a visual take-off,

(*iii*) climbing, and climbing turns, with varying airspeeds, power settings and rates of climb,

(*iv*) level flight including rated turns on given headings, reducing speed to safety speeds and returning to cruising speed, maintaining height and heading,

(*v*) asymmetric flight (for multi-engined aircraft only). Engine failure, Ability to deal efficiently and smoothly with an emergency situation with one engine inoperative; to carry out—straight and level flight, level rated turns, on given headings by timings, straight ascents and descents. Descending turns, rated and timed on given headings with and against operative engine,

(*vi*) limited panel manoeuvres ; using altimeter, airspeed indicator turn and bank indicator, vertical speed indicator, magnetic compass and clock only, to execute :

(*a*) straight and level flight,

(*b*) rated turns on given headings by timings in both directions.

(B) *Airways Procedures.*—obtaining in flight clearance from A.T.C. to fly a required Track, or a range leg, identify a radio range, or a N.D. radio beacon, and carry out standard holding pattern over any of them as directed.

(C) *Descent through cloud or let-down procedures*—using either a V.O.R. radio range, N.D. beacon or R/T QDM to carry out standard let-down procedure, and make an approach to land using I.L.S. or radar if available. An examiner may require this exercise to be carried out on any one or more of the facilities available.

(D) *Overshoot procedure.*—following a let-down procedure to carry out an overshoot or standard missed approach procedure, climbing to given altitudes, on given headings.

Tolerance Limits	Full Panel	Limited Panel	Asymmetric.
Height . . .	(i) ± 100 feet (ii) at critical height —0+100 feet.	±100 feet	±200 feet
Heading . .	±5°	±20°	±10°
Speed . . .	(i) ±5 knots (ii) +10 knots, whilst under- —5 carriage down or aircraft climbing.	±10 knots	+10 knots — 5

Applicants who undertake these tests in single engined aircraft and are granted the I. R. will have to undertake the test in multi-engined aircraf if subsequently they wish to exercise privileges of I.R. on multi-engined aircaft.

6. *Validity.*—The Instrument Rating shall be valid for a period not exceedng 12 months from the date of issue and shall normally be coterminus with the pilots licence.

7. *Renewals.*—Instrument Rating will be renewed on production of proof of a successful medical examination, and proof of successfully completing the renewal flight tests, within 3 months prior to the date of expiry of the rating. The flight tests required for renewal are the same as for initial issue, as given in Para. 5 above, except that the tolerance limits shall be such as may be prescribed by the D.G.C.A. from time to time.

8. *Privileges.*—Subject to the endorsements in the licence, the privileges of the holder of an Instrument Rating shall be to pilot an aircraft under I.F.R.

Flight Instructor Rating

Applicant for a Flight Instructor Rating shall meet the following requirements :—

1. *Age* : He shall be not less than 21 years of age.

2. *Other requirement* :—He must be a holder of

(*i*) a valid professional Pilot's licence *i.e.* a commercial, senior commercial, or airline transport pilot's licence and

(*ii*) a valid Instrument Rating.

3. *Knowledge.*—He shall pass an oral examination in the following subjects :

(*i*) Aerodynamics and principles of flight.

(*ii*) Principles of flight instruction including practical instruction and instrument flying.

(*iii*) Navigation.

(*iv*) Air Traffic Control and rules of air.

(*v*) Principles and practice of asymmetric flight (where multi-engined aircraft are to be endorsed on the rating). Syllabus for each subject is given in Appendix II to these rules.

4. *Experience.*—He shall produce evidence of having satisfactorily completed :—

(*i*) not less than 500 hrs. of flight time as Pilot-in-Command including not less than 20 hrs. of flight by night, which must include not less than 20 take-offs and 20 landings,

(*ii*) an approved flight instructor's course.

5. *Skill.*—He shall undergo satisfactorily a flying test, by day and by night with an approved examiner or instructor in an aircraft fitted with dual controls. The test shall comprise of such of the items from the syllabus as the examiner deems necessary for the type of aircraft concerned. Details of the approved syllabus for flight instructor's course are given separetely.

6. *Validity.*—Flight instructor's rating shall remain valid concurrently with the holder's pilot licence, on which it is endorsed.

7. *Retention.*—Flight instructor's rating would be retained provided the applicant produces satisfactory proof of, having carried out not less than 20 hrs. instructional flight time during the twelve months, immediately preceding the date of application for renewal of the pilots licence. Applicants who do not have the required recent flying experience, shall have to undergo successfully a flying test as laid down in para. 5 above.

8. *Aircraft*:

(*i*) The holder of a Flight Instructor's Rating is entitled to impart instruction on all types of aircraft below 5700 kgs. all up gross weight and which are entered in the aircraft rating of his pilot's licence.

(*ii*) Types of aircraft above 5700 kgs. all up gross weight will be indicated separately on the instructor's rating. For inclusion of a type above 5700 kgs. gross weight the holder shall have to produce evidence of having completed not less than 500 hrs. of flight time as Pilot-in-Command, and of having passed in the flying tests as laid down in para. 5 above. The flying experience and flying tests shall have carried out on the type of aircraft desired to be included in the instructor rating. The requirements under this sub-clause may be waived by the D.G.C.A. under special circumstances in the case of an experienced pilot, who has successfully completed any specially approved course of training.

9. *Privilege* .—Subject to the Ratings and endorsements in the Pilots licence the privileges of the holder of a flight instructor rating, shall be

(*i*) to supervise and authorise Solo flights by student pilots,

(*ii*) to impart flying instructions for the purposes of initial issue, continuance, or renewal of a Pilot's licence, or a rating in a Pilot's licence, in respect of all aircraft endorsed in the aircraft rating of his pilot's licence and which are below 5700 kgs. gross weight, and also in respect of all aircraft specially shown on his instructor's rating, and having a gross weight in excess of 5700 kgs.

Syllabus for the Pilot Instructor's Course (Flying Training)

1. *Aircraft Familiarzation and Cockpit layout.*

(*a*) Explanation of the aircraft, various components and layout of the cockpit.
(*b*) Controls—their location and function.
(*c*) Instruments—Location, function, and principles of operation.
(*d*) Aircraft systems—fuel and oil system, various components, capacities, etc.

2. *Preparation for Flight.*

(*a*) External Checks.
(*b*) Internal checks before starting, Cockpit Check.
(*c*) Starting and warming up.
(*d*) Power Check and engine run up.

3. *Air experience and aircraft in flight familiarzation.*

4. *Taxying and use of brakes and control of the aircraft on ground.*

(*a*) Use of power and effect of aircraft controls.
(b) Control of direction.
(*c*) Lockable tail wheel.
(*d*) Appreciation of speed and use of brakes.
(*e*) Engine and other instruments.
(*f*) Clearances-prop. wing tips, tail, etc.

5. *Effect of Controls in Flight.*

(*a*) Primary controls.
(*b*) Further effect of aileron and rudder.
(*c*) Effect of airspeed and slipstream.
(*d*) Effect of changing power.
(e) Effect of the elevator.
(*f*) Aileron drag.
(*g*) Coordination of controls and Trimming controls.
(*h*) Effect of undercarriage, flaps, slots.
(*i*) Engine controls.

6. *Straight and level flight.*
   - (*a*) Aircraft altitude and its control in all three planes.
   - (*b*) Power and speed variation.
   - (*c*) Balance.
   - (d) Trim.
   - (*e*) Instrument indications.

7. *Climbing and Descending.*
   - (*a*) Climbing at recommended power and speed.
   - (*b*) Climbing at maximum rate.
   - (*c*) Effect of flaps on climb performance.
   - (*d*) Climbing with flaps and gear down.
   - (*e*) Gliding.
   - (*f*) Engine assisted descent.
   - (*g*) Effect of flaps and undercarriage.
   - (*h*) Engine handling.
   - (*i*) Instrument indications.

8. *Stalling.*
   - (*a*) Initial demonstrations and recovery.
   - (*b*) Stall with power-on.
   - (*c*) Effect of flaps and undercarriage.
   - (*d*) Recovery after the wing has dropped.
   - (*e*) Recognition of an approach to stall and recovery.
   - (*f*) Stalling speeds—effect of undercarriage, flaps, power, slots.

9. *Turning.*
   - (*a*) Condition of controls in a turn.
   - (*b*) Medium turns in level flights.
   - (*c*) Climbing turns.
   - (*d*) Gliding turns with or without flaps.
   - (*e*) Engine assisted descending turns.
   - (*f*) Stalling in the turn.
   - (*g*) Faults in turns and check on instruments for correct turns.

10. *Steep turns.*
   - (*a*) Effects on controls.
   - (*b*) Maximum rate turns.
   - (*c*) Steep turns with power.
   - (d) Steep climbing and descending turns.
   - (*e*) Stall during a steep turn.

11. *Spinning.*
   - (*a*) Precautions before starting a spin.
   - (*b*) Spin from a straight glide and recovery action.

(*c*) Spin from a turn and recovery action.
(*d*) Recovery from an incipient spin.

12. *Take-off and climb.*

(*a*) Checks and actions before take-off.
(*b*) Take-off using elevator and throttle.
(*c*) Take-off using all controls and Power reduction.
(*d*) Procedure after flying speed is reached.
(*e*) Action in the event of engine failure.
(*f*) Take-off with flaps.

13. *Approach and landing.*

(*a*) Vital actions and cockpit check.
(*b*) Glide approach and landing correct speeds.
(*c*) Engine assisted approach and landing.
(*d*) Wheel landing, three point landing, tricycle landing.
(*e*) Correction for high holding off, halving and mislanding of wrong technique. (Correction of landing faults.)
(*f*) Use of flaps for approach and landing.
(*g*) Going round again.

14. *Correct procedure and airmanship.*

(*a*) Appreciation of circuit pattern.
(*b*) Right hand and left hand circuits.
(*c*) Method of leaving and joining circuits.
(*d*) Attention to ground control for directions.
(*e*) Signal area and signals displayed at the aerodrome.
(*f*) Obstructions and other traffic in the circuit.

15. *Low flying.*

(*a*) Cockpit check.
(*b*) Use of throttle, trim and flaps.
(*c*) Effect of winds and turbulance.

16. *Side slippings.*

(*a*) Effect of controls during side slip.
(*b*) Slipping into wind.
(*c*) Slipping turn.

17. *Cross wind take-off.*

(*a*) Assessment of cross wind component and effect.
(*b*) Correct take-off technique.

18. *Precautionary landings.*
    - (*a*) Cross wind landings.
    - (*b*) Landing without flaps.
    - (*c*) Landing technique for short available run.

19. *Forced landings.*
    - (*a*) Selection of the area for landing.
    - (*b*) Assessing wind direction and strength.
    - (*c*) Orientation and approach.
      - (*i*) Forced landing without power.
        - (A) Planning the descent.
        - (B) Final approach and adjusting height of the aircraft.
      - (*ii*) Forced landing with power.
        - (A) Inspection of the landing path and location of land marks.
        - (B) Approach and landing.

20. *Instrument flying.*
    - (*i*) Effect of controls.
      - (*a*) Movement in pitch, roll and direction.
      - (*b*) Cross reference between all instruments that indicate pitch, roll and direction.
      - (*c*) Slipping and skidding.
    - (*ii*) Straight and level flight.
      - (*a*) Instrument indication and interpretation.
      - (*b*) Attitude alternations.
      - (*c*) Power changes.
      - (*d*) Orientation.
    - (*iii*) Climb and descend.
      - (*a*) Instrument interpretation of climbing attitude.
      - (*b*) Varying rates of climb at constant airspeed.
      - (*c*) Constant rate of climb at varying airspeeds.
      - (*d*) Levelling off.
      - (*e*) Instrument interpretation of descending attitude.
      - (*f*) Constant airspeed at varying rates of descent.
      - (*g*) Gliding.
      - (*h*) Constant rate of descent at varying airspeeds.
      - (*i*) Orientation.
    - (*iv*) Stalling.
      - (*a*) Flying level at low safe cruising speed.
      - (*b*) Approach to stall and recovery.
      - (*c*) Stalling and recovery.

(*v*) Turning.
  (*a*) Medium turn in level flight.
  (*b*) Turning at a specified rate on to a direction indicator heading.
  (*c*) Climbing turns.
  (*d*) Descending turns.
  (*e*) Turning on to compass headings.
  (*f*) Steep turns with power.
  (*g*) Stalling in the turn.
  (*h*) Maximum rate turns.
  (*i*) Steep climbing and descending turns.

(*vi*) Spinning.
  (*a*) Instrument indications in incipient stage.
  (*b*) Instrument indications during spin.
  (*c*) Recovery procedure from spin.
  (*d*) Recovery procedure from spiral dive.

(*vii*) Take-off.
  (*a*) Instrument take- off.

21. *Night Flying.*

  (*a*) Check for night flying equipment.
  (*b*) Cockpit check and check for instruments.
  (*c*) Taxying.
  (*d*) Take off.
  (*e*) Circuit pattern and turns.
  (*f*) Approach.
  (*g*) Landing with or without landing lights.
  (*h*) Going round again.
  (*i*) Correction of landing faults.
  (*j*) Forced landing on the aerodrome.

22. Action in the event of fire.

23. Restarting engine in flight.

24. *Pilot Navigation.*

  (*a*) Study of weather conditions and appreciation of meteorological information.
  (*b*) Selection and preparation of maps and study of route.
  (*c*) Flight planning, flight clearance.
  (*d*) Setting course and course steering.
  (*e*) Estimation of drift and correction of track errors in flight.
  (*f*) Ground speed and safety height and map reading.
  (*g*) Fuel conservation.
  (*h*) Mental D.R.

(*i*) Document to be carried.

(*j*) Location of destination.

(*k*) Use of a simple computor.

25. *Aerobatics.*

(*a*) Loop.

(*b*) Slow roll.

(*c*) Stall turn.

(*d*) Roll of top of a loop.

(*e*) Half roll.

During the above flying tests, a candidate will be required to give demonstrations as an Instructor, while the examiner may act as either as a trainee pilot or as observer.

ASSISTANT FLIGHT INSTRUCTOR'S RATING

An applicant for the grant of an Assistant Flight Instructor's rating shall meet the following requirements.

1. *Age* :—He shall be not less than 20 years of age.

2. *Other requirement* :—He shall be a holder of a valid professional pilot's licence *i.e.* a Commercial, Senior Commercial or Airline Transport Pilot's licence.

3. *Knowledge* :—He shall pass an oral examination in the following subjects :

(1) Aerodynamics and principles of flight.

(2) Principles of flight instruction.

4. *Experience* :—He shall produce evidence of having satisfactorily completed :

(A) not less than 300 hrs. of flight time as Pilot-in-Command and

(B) not less than 10 hrs. flying training as an instructor under a rated Flight Instructor.

5. *Skill* :—He shall undergo satisfactorily a flying test with an approved examiner in an aircraft fitted with dual controls. The tests shall comprise such of the items from the syllabus as the examiner deems necessary for assessing the candidate's ability and aptitude for flight instructor's duties.

6. *Validity* :—Assistant flight instructor's rating shall remain valid concurrently with the holder's pilot licence on which it is endorsed.

7. *Retention* :—Assistant Flight Instructor's Rating would be retained provided the applicant produces satisfactory proof of having carried out not less than 20 hrs. instructional flight time during the 24 months immediately preceding the date of application for renewal of the pilot's licence. Applicants who do not have the required recent flying experience shall have to undergo successfully a flying test as laid in Para. 5 above.

8. *Aircraft* :—The holder of an Assistant flight Instructor's rating is entitled to impart instruction on all types of aircraft not exceeding 1500 kgs. all up gross weight and which are entered in the aircraft rating of his pilot's licence.

9. *Privileges* :—

(1) Subject to the Ratings and endorsements in the Pilot's licence, the privileges of the holder of an Assistant flight instructor's rating shall be to impart flying instruction under the supervision of a rated flight instructor during day under V.F.R. only.

(2) He shall not authorise any Student Pilot to undertake his first Solo flight.

APPENDIX 12

Breakdown of the Flying training recommended to be carried out at the Flying School.

HT-2/Chipmunk.

	By day		By night	
	Dual	Solo	Dual	Solo
Initial dual for 1st solo (15-20 hours)	20	..	3	..
Consolidation	3	25	1	3
Stalling & spinning	2	2		
Emergencies	1	1		
Steep turns & side slipping	5	10		
X-wind landings	2	7		
Forced landings	5	10		
Instrument flying	8	..		
X-Country flying	..	82	5	5
	51	137	9	8

Advanced on Anson aircraft.

Initial dual for solo including all dual for emergencies.	15	..	
Solo	..	3	
Instrument rating	18	..	
Short & Precautionary landings.	2	2	
	35	5	
Day & night flying on HT-2/Chipmunk	60	145	
Total on all types of aircraft.	95	150	
			5 hours for tests etc.
Grand total flying hours per pupil	250		

Existing Flying Training Syllabus of Flying School.

BREAKDOWN OF FLYING (INTERMEDIATE COURSE)

(Persons who have already flown 100 hrs.)

Aircraft	Ab-initio	Advance		X-country Day		Night flying			Instrument flying	Total
	Dual	Dual	Solo	Dual	Solo	Dual	Solo	XC		
Chipmunk & HT-2	..	15	80	10	70	5	5	5	5	195
Anson	15	..	..	..	..	..	..	..	..	15
Dakota	9	..	..	2½	..	1½	..	..	2	15

Aircraft	Dual	Solo	Total
Chipmunk & HT-2	35	160	195
Anson	15	..	15
Dakota	15	..	15*
TOTAL	65	160	225

Ab-initio Course

Aircraft	Ab-initio	Advance		X-country Day		Night flying			Instrument flying	Total
	Dual	Dual	Solo	Dual	Solo	Dual	Solo	XC		
Chipmunk & HT-2	20	20	120	10	70	5	5	5	5	260
Anson	15	..	..	..	..	..	..	..	..	15
Dakota	9	..	..	2½	..	1½	..	..	2	15

Aircraft	Dual	Solo	Total
Chipmunk & HT-2	60	200	260
Anson	15	..	15
Dakota	15	..	15*
TOTAL	90	200	290

*Additional training upto a maximum of 5 hours flying without additional fee is given to trainees to bring them to the proper standard, if necessary.

APPENDIX 13

Available Flying Days for the School.

		Days
Total days in a year		365
Less	Days	
(*i*) Summar vacation	46	
(*ii*) Sundays	45	
(*iii*) Government holidays	20	
		111
Total working days available		254
First Training Year		
Ground training days prior to flying	51	
Bad weather days (Approx.)	18	
Terminal Examinations	15	
		84
Total Flying days available First Year		170
Second Training Year		
Total working days available	..	254
Bad weather days approximately	38	
Terminal Examination	15	
		53
Total flying days available Second year		201
Flying days required for Anson flying (3 months)	..	71
Total Flying days available for S. Engine Second Year	..	130

NOTE: Thus a trainee will have 300 days available for flying in light aircraft and 71 days for Anson aircraft.

Requirement of HT-2/Chipmunk.		Hours.
Average flying hours required for each trainee in a year	210 / 2 years	105

Total flying required for 60 trainees (2 courses of 30 intake)	6300
Average flying days available for HT-2 in a year $\frac{170 \text{ plus } 130}{2 \text{ yrs.}}$	150
Daily flying task	42
**Flying hours available daily per aircraft . .	3
Number of HT-2/Chipmunk required daily $\frac{42}{3}$	14 aircraft.
Standby aircraft	1 ,,
20% Reserve for minor snags repairs . . .	3 ,,
Total requirement of Light S. Engine aircraft. . .	18

Requirement of Ansons

Flying hours required for each trainee . . .	40 Hrs.
Total flying required for 25 trainees (30 less 5 wastage)	1000 ,,
Number of flying days available	71 days.
Daily Flying task $\frac{1000}{71}$	14 Hrs
**Flying hours available daily per aircraft . .	3 Hrs.
Number of Ansons required daily 14/3	5 aircraft
Standby aircraft	1 ,,
20% Reserve for minor snags/repairs . . .	1 ,,
Total Ansons required	7

Requirement of DC-3

Flying hours required for each trainee . . .	10 Hrs.
Total flying required for approx. 5 Private Airline Pilots	50 Hrs.
Aircraft required	1 aircraft
Standby and 20% Reserve for minor snags repairs .	1 ,,
Total DC-3 required	2 ,,

***Aircraft Utilisation per day*

Tarmac period available (only from 0630 Hrs.—1130 Hrs.) due to Midday turbulence, ground training in afternoon .	5 Hrs.
Less	
Time taken for refuelling, briefing and de-briefing of 4 sorties.	2 Hrs.
Actual flight time available per aircraft. . . .	3 Hrs.

Requirement of Instructors on HT-2/Chipmunk Aircraft.

	Hours
Dual hours required per trainee (60 *plus* 5 hours' flying tests)	65

Total instructional hours per course (65 × 30) . .		1950
As both courses will be under training for two years, total dual required per year		1950
Average flying days available in a year . . .	$\frac{(170 \text{ plus } 130)}{2}$	150 days.
Daily instructional hours required	$\frac{1950}{150}$	13 Hrs.
At the rate of 3 hours of instructional flying per day, number of instructors required	$\frac{13}{3}$	4·3

Requirement of Anson Instructors.

Instructional hours required per trainee . . .		35
Instructional hours per year for 25 trainees . . .	(35 × 25)	875
Flying days available for Anson training . . .		71
Daily instructional hours	$\frac{875}{71}$	12
At the rate of 3 hours of instructional flying per day, number of instructors required	$\frac{12}{3}$	4

Instructors on DC-3

Total instructional hours required for 5 trainees (5 × 10)		50
Number of instructors required		1

NOTE.—It may be seen that the Anson flying will be done only in the last 3 months of the second year of a course. The instructor requirement on Anson aircraft will be only for these 3 months. The instructors on light aircraft will also remain idle for this course during these three months. Therefore, if we have instructors qualified to instruct on HT-2, Chipmunk and Anson types of aircraft, then their combined utilisation can reduce the required strength of instructors. The total dual instructions on HT-2, Chipmunk and Anson will be (1950) plus (875) 2825. That means a total of 2825 instructional hours will have to be carried out in a year. At the rate of 3 hours per day utilisation of an instructor and approximately 185 days available in a year $\left(\frac{300 \text{ plus } 71}{2}\right)$, an instructor is capable of 555 hours of flying in a year. For 2825 instructional hours, the requirement, therefore, will be of five instructors. Certain allowances for sickness and supervision of solo flights etc. have to be made. A total strength of six instructors would be adequate provided they are all capable of instructing on single and twin-engine aircraft.

The pupil instructor ratio in the Air Force Schools is one instructor to 3 trainees (1:3). If we accept a ratio of one instructor to 10 trainees for the Flying School, then a tentative figure of 6 instructors for two courses running at the Flying School will be required.

APPENDIX 14

Note recorded by Shri Bhadreshwar Prasad Singh, Managing Director, Hind Provincial Flying Club Limited, Lucknow.

Government has appointed the "R aha Committee" to go into the question of Selection, Training and Licensing of Civil Air Pilots. The Committee has extensively toured all over India and I, as a member went along with the Committe to every place barring Jodhpur. Most of the important people connected with aviation were interviewed and representatives of important Flying Clubs also gave evidence. I am in general agreement with all the recommendations of the Committee barring a few which I am mentioning below.

There were quite a few witnesses who remarked that the training in the Clubs was not up to the standard, specially the ground lectures. They also mentioned that the boys from the Clubs lacked 'discipline'. I quite agree that with the adoption of ICAO standards the training has to be of a higher quality, both for 'Private' licence and 'Commercial' Pilot's licence for which the country has got to be prepared. The Committee has restricted flying in the Clubs up to Private licence and N.C.C. flying and it seems to me that justice is not being done towards those organisations which so far have been rendering sterling service to the country and are now relegated to a position in which their very existence is problematical. On the other hand, the consensus of opinion seems to be in favour of giving Commercial Pilot's licence to the Civil Aviation Training Centre or Flying School. Is it because the training there is regarded to be more thorough and systematic? If the training at the Civil Aviation Training Centre is more thorough and systematic, then is it to be taken that it is the only place where a certain standard could be maintained and that no other Club could attain that standard? If this is felt, then I am afraid that I connot be a party to this opinion.

The Committee has recommended that there should be standardisation of training at the Flying Clubs and it has also suggested that the Flying School should be run and administered by an independent body, of course, aided and subsidised by Government. The only thing that could be pointed out is that the Clubs are not properly equipped to impart that high standard of ground training. I also somehow do not agree that the Flying School should run under two administrative heads as per the Committee's recommendation, *viz*; one for the flying side and the other for ground training. How will these be synchronised? My personal opinion on this is that the present set up be maintained and an independent high powered board should be set up to recommend how the School should be run. There is no reason why the recommendations of that high powered board should be ignored. Some of the Clubs certainly can maintain that standard if not better, provided it is the wish of the Committee and the Government to enable the Clubs to keep up their old record of service to the country and not throw them on the scrap heap. Why is it not possible for the Director General of Civil Aviation to lay down a certain rigid standard of training and stick to it? They are the people who finance the Clubs and certainly they can dictate their terms to the Clubs. The Clubs will have no option but to harp to the tune.

There is one more drawback in doing the advance training at the Civil Aviation Training Centre or the Flying School. This will mean that all advance training will be centralised and will be confined to only one place. In an emergency, supposing the place is bombed out, is it not better to have the training at different places? May it not happen, but if this happens I am sure everybody will agree that such training cannot be imparted easily and without the unwanted delay in producing trained personnel. Let the Civil Aviation Training Centre or Flying School also train but to single it out as the only such institution will mean doing injustice to the Clubs and favour to a single institution.

Now that our country has been divided into five administrative zones, *i.e.*, Northern, Eastern, Southern, Western and Central **Zones**—the Government can certainly select one Club in each zone (if not all Clubs) to fit and equip it to cope with the now proposed advanced training. This certainly seems very feasible and these zonal institutions or Clubs can complete single-engine flying, if not all, at least up to 100 hours, and the Civil Aviation Training Centre or the Flying School can take up the twin-engine training.

Now coming to the National Cadet Corps flying, I have nothing much to say—only this much that it has been much below expectation. If we go through the Master Committee report, it clearly mentions that by the end of 1956, the National Cadet Corps flying will come up 24,000 hours annually. This is the begining of 1958 and the total flying done by the National Cadet Corps has been only 4,700 hours by the end of 1957, which is divided between a dozen Clubs. Off and on we hear that more boys will be coming from the National Cadet Corps but has seldom materialised. Once a College or University opens a National Cadet Corps Squadron, the boys come to the Flying Clubs fully after two years because for the first two years they are given ground lectures. Now if it is said that the Clubs are not able to cope up with the National Cadet Corps flying, then it might be true in certain cases but not in all. But has thought been given to the question why the Clubs have not been able to meet fully the commitments expected of them? The reason is obvious, at least to me. It is nothing but the luke warm and **stemotherly** treatment towards the Clubs against the favourite of the Directorate I, of course, mean the Civil Aviation Training Centre. Has the Directorate ever made a serious effort to increase the number of Instructors in the country? Have they ever started an Instructor's course (I mean a real wholehearted effort)? Why cannot they take some boys who they think fit for being Instructors and not take those boys for the Airlines? The Committee has suggested, that Flying Instructors should be trained at the I.A.F. School at Tambaram I personally do not think it practicable not because I am prejudiced but because of past history. It is on record that the Indian Air Force promised to release some pilots when the Indian Airlines Corporation was literally in a crisis but the Indian Air Force ultimately backed out of their commitment. I am only afraid that history might repeat itself. Wouldn't it be in the fitness of things if we civilians rely on our own resources and train our Instructors in our own school which is fully equipped and leave the Indian Air Force to do their job? Why shouldn't our School be utilised thus? The clubs would have the facility of sending their boys to the School for getting Instructor's training and the School can, of course, charge whatever is reasonable. The Civil Aviation Training Centre had quite recently Instructors from the Clubs but if those very Instructors went back to their parent body, why shouldn't those Clubs be allowed to train Commercial

Pilots provided they have facilities for ground training. But the Civil Aviation Training Centre can always fall back on the Indian Airlines Corporation to get Instructors on the excuse that they want to train boys at the Civil Aviation Training Centre for the airlines. Why the same facility could not be given to the Flying Clubs, if not to all, at least to those that want it?

My suggestions to the Committee and to the Government might be taken as a biased opinion but I do not feel shy of voicing it with all the emphasis at my command when I say that the *ab-initio* course at the Civil Aviation Training Centre should be abolished and the Civil Aviation Training Centre should only take those boys for advance training who apply from the Clubs. If the Committee's suggestion of taking up boys with no flying experience is accepted then why will the boys join the clubs to spend money and waste an year or so at the Clubs? The other point that I want to emphasise is that the Clubs be allowed to train boys upto at least 100 hours if not the whole single-engine training and then they should be taken in the Civil Aviation Training Centre and then at Flying School. The adoption by the Committee of the fact that Commercial Pilot's licence should be issued after 250 hours means that 150 hours at the Civil Aviation Training Centre will be quite enough to polish up the boys for advance training.

Why is it not possible for the Civil Aviation Training Centre or the School to concentrate only on the advance training of the boys? They can get more multi-engined aircraft if necessary which are beyond the capacity of the meagre funds of the Clubs—this seems a just and fitting occupation for the Civil Aviation Training Centre or School which is already catering for the Indian Airlines Corporation.

If my suggestions are accepted, it will mean that the Clubs will have their full time work and the Civil Aviation Training Centre or School can also justify its existence fully.

Sd/—B. P. SINGH, 31-1-58

GMGIPND—LS—63 M. of T.&C.—26-9-58—700

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